The American FERTILIZER

All Fertilizer and Feeding Materials

1850—1946

POTASH SALTS
SULPHATE *of* AMMONIA
NITRATE *of* SODA
NITROGANIC TANKAGE
(Activated Sludge)
DEFLUORINATED PHOSPHATE

Importers *Exporters*

PERUVIAN BIRD GUANO, FISH MEAL
BONE MEAL, TANKAGE, BLOOD
NITROGENOUS

96 Years of Service

H. J. BAKER & BRO.

271 Madison Avenue, New York

BALTIMORE • CHICAGO • SAVANNAH • BUENOS AIRES

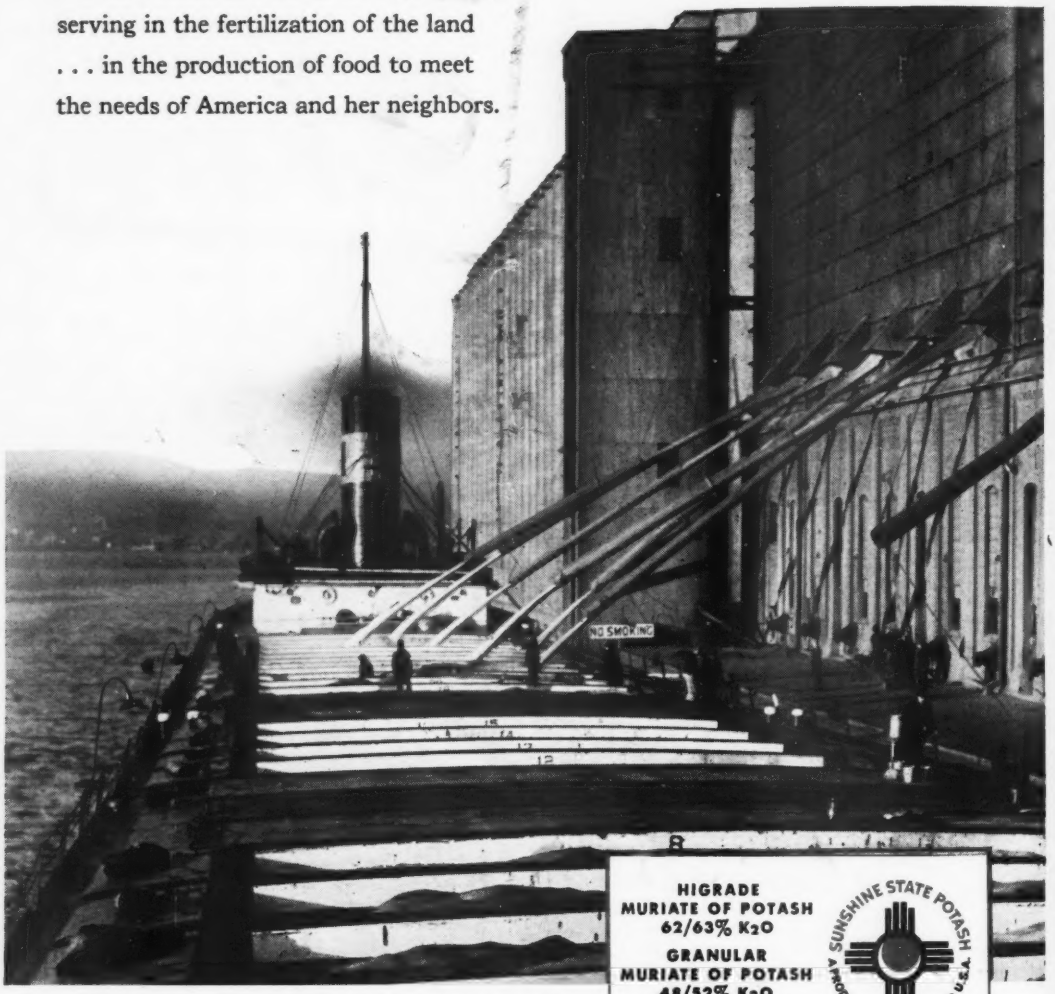
UNIVERSITY OF MINNESOTA REC'D SEP 30 1946 AGRICULTURAL LIBRARY

HORN OF PLENTY...

Here it is . . . Golden Wheat . . . near the end of the line in the production of grain to feed the world. But the first step was the making of an enriched, fertile soil.

Your fertilizers, many of them compounded with potash, are vitally needed in this first step . . . the enrichment of the land. For potash increases soil fertility . . . strengthens resistance to disease and drought.

Sunshine State Potash is importantly serving in the fertilization of the land . . . in the production of food to meet the needs of America and her neighbors.

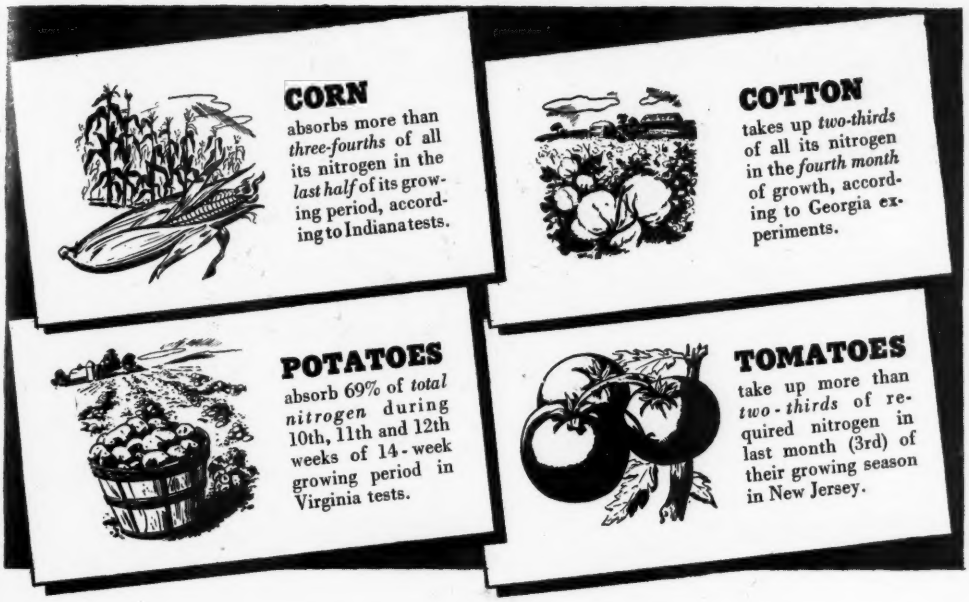


UNITED STATES POTASH COMPANY
Incorporated
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 48/52% K_2O
MANURE SALTS 22/26% K_2O

SUNSHINE STATE POTASH
A PRODUCT OF NEW MEXICO U.S.A.
Reg. U. S. Pat. Off.

Published every other Saturday. Annual subscription: in the United States, $3.00; Canada and Mexico, $4.00; other countries, $5.00. Entered as second-class matter, January 15, 1910, at the Post Office at Philadelphia, Pa., under Act of March 3, 1879. Registered in United States Patent Office. Publication office, 1900 Chestnut St., Phila.3, Pa.


CORN
absorbs more than three-fourths of all its nitrogen in the last half of its growing period, according to Indiana tests.
COTTON
takes up two-thirds of all its nitrogen in the fourth month of growth, according to Georgia experiments.
POTATOES
absorb 69% of total nitrogen during 10th, 11th and 12th weeks of 14-week growing period in Virginia tests.
TOMATOES
take up more than two-thirds of required nitrogen in last month (3rd) of their growing season in New Jersey.

Here's how to make your *FERTILIZER FIT THE CROP*

Many crops need most of their nitrogen during the latter part of the growing season . . . They need a nitrogen fertilizer that will resist leaching yet be readily available when required by the growing plants. That is exactly the way UREA-NITROGEN reacts in the soil.

UREA-NITROGEN resists leaching. Yet, urea is completely available to plants. That's why your fertilizer is ideally suited to such plants when you use UREA-NITROGEN.

Du Pont UREA-AMMONIA LIQUORS give you low-cost sources of urea nitrogen. They also produce quick-curing mixtures that store well, drill well and have a low acid reaction.

To meet the varying requirements of manufacturers, Du Pont supplies four UREA-AMMONIA LIQUORS and URAMON Fertilizer Compound. For further information, write E. I. du Pont de Nemours & Co. (Inc.), Ammonia Department, Wilmington 98, Delaware.

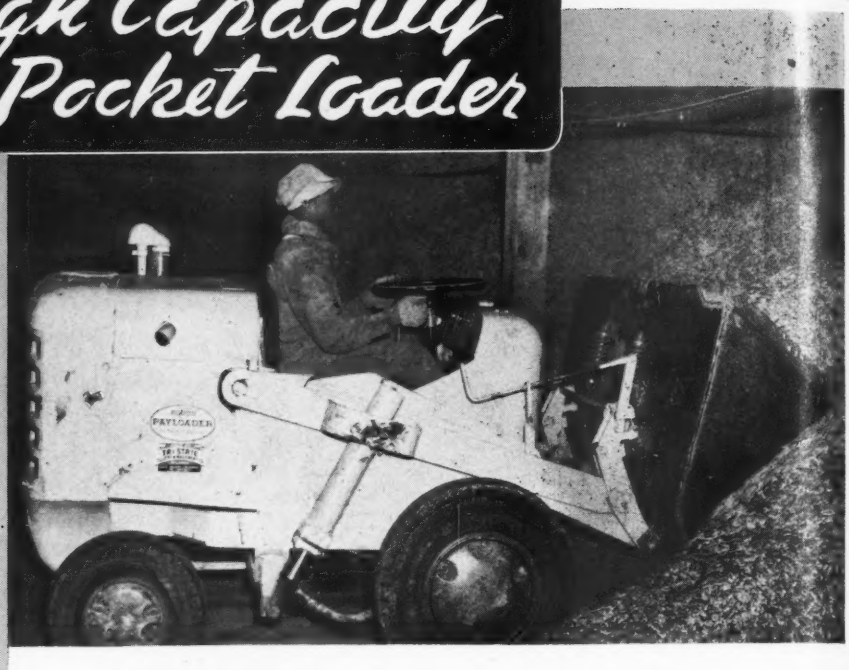
NITROGEN THAT FITS THE CROP

DU PONT UREA NITROGEN { **UREA-AMMONIA LIQUORS** • **URAMON** Reg. U.S. Pat. Off. **Fertilizer Compound**

DU PONT REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

A High Capacity Vest Pocket Loader



The Hough Model "HA" Payloader completely fulfills the need of the fertilizer industry for a compact, readily maneuverable loader for handling bulk materials economically. The "HA" Payloader is the result of many years of development work and exhaustive operating tests. It has already proved itself in nearly a hundred fertilizer plants.

Maneuverability reaches a new high with this unit. It loads and operates with ease and thoroughness in and out of a box car, the overall width is only 49", the wheel base 48½" and the turning radius only 6'6". One man with the "HA" Payloader loads bulk material, carries it 100 feet and dumps it at a rate of 25 to 50 tons per hour. It will do the work of 8 to 10 men.

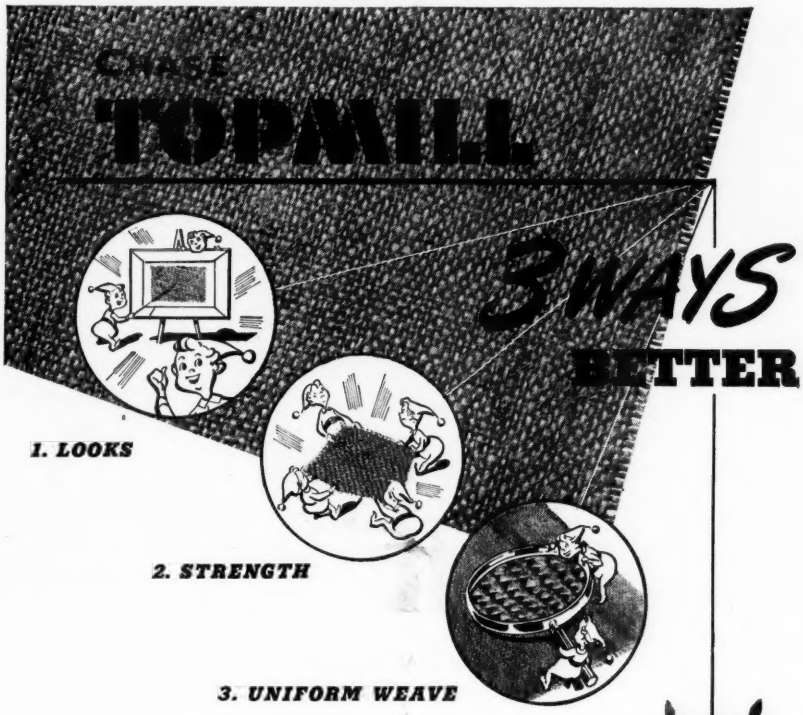
The "HA" Payloader is a rugged powerful tractor unit—not an attachment for a tractor. Power is furnished by a heavy duty 4 cylinder 29 H.P. engine. Two speeds forward and two reverse provide ample flexibility and speed of movement. The bucket is hydraulically actuated by twin cylinders and has the exclusive tip-back feature which prevents spillage.

The Model "HA" Payloader is the material handling unit you have been waiting for. There are over 3500 Hough Loaders in service.

Write for full information.
We have a Distributor near you.

THE FRANK G. HOUGH CO.
Libertyville, Illinois . "Since 1920"

HOUGH Payloader SHOVELS



Not just 1, or 2, but 3 ways better! Chase TOPMILL burlap looks better, wears better, IS better! And here's why: Chase buys only from the mills in India whose products meet our high standards —standards of appearance, strength and weaving that are the result of 99 years' experience in the bag business.

To assure you real TOPMILL quality, a Chase burlap expert went to the Calcutta burlap market. He inspected mills, checked samples, made recommendations—all with *your* needs uppermost in mind. The result is Chase TOPMILL—the better burlap with looks, strength, and uniform weave.

Specify this better burlap by name—Chase TOPMILL.

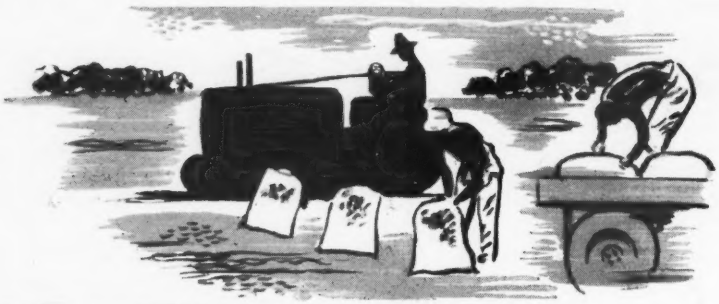
***CHASE Brite-Weaves—No Finer Burlap** . . . Specify Brite-Weaves for premium-grade burlap. Rich, light-colored burlap — not specky or fuzzy. Extra thread count. Fine, even weave with silk-like sheen. It's the aristocrat of burlaps!*

FOR BETTER BAGS — BETTER BUY CHASE

CHASE BAG CO.

GENERAL SALES OFFICES, 309 WEST JACKSON BLVD. • CHICAGO 6, ILLINOIS

BOISE • DALLAS • TOLEDO • DENVER • DETROIT • MEMPHIS • BUFFALO • ST. LOUIS • NEW YORK • CLEVELAND • MILWAUKEE
PITTSBURGH • KANSAS CITY • MINNEAPOLIS • GOSHEN, IND. • PHILADELPHIA • NEW ORLEANS • ORLANDO, FLA. • SALT LAKE CITY
OKLAHOMA CITY • PORTLAND, ORE. • REIDSVILLE, N. C. • HARLINGEN, TEXAS • CHAGRIN FALLS, O. • HUTCHINSON, KAN. • WINTER HAVEN, FLA.



You'll Save Time and Money

in the manufacture of fertilizers of dependable quality and uniform grade when you use

International Crop-Producing FERTILIZER MATERIALS

Florida Pebble Phosphate Rock
68%–70%–72%–75%–77%
Tennessee Phosphate Rock
65%–68%–70%–72%
Montana Phosphate Rock
Superphosphate
Multiple Superphosphate
Domestic Potash Salts
All Standard Grades of Potash
Including SUL-PO-MAG
(Sulphate of Potash-Magnesia)
Complete Fertilizers

These two things you can be sure of when you depend on International Fertilizer Materials—the quality of the ingredients and their excellent mechanical condition. Both are important to you in manufacturing costs and in the uniformity of your own fertilizers. You get, in addition, the advantages of International's large volume production and the prompt, efficient service from its conveniently located plants.

International MINERALS CHEMICALS

MINERALS & CHEMICAL CORPORATION

General Offices • 20 North Wacker Drive • Chicago

PHOSPHATE • POTASH • FERTILIZER • CHEMICALS

The American FERTILIZER

Vol. 105 SEPTEMBER 21, 1946 No. 6

Fertilizers in Wartime Germany

By K. D. JACOB

Bureau of Plant Industry, Soils, and Agricultural Engineering,
Agricultural Research Administration,
U. S. Department of Agriculture,
Beltsville, Maryland

THE writer was privileged to spend the last quarter of 1945 in Germany investigating fertilizer and soil fertility developments.[1] During the course of the investigation, much statistical information was obtained on Germany's wartime production, export, import, and consumption of fertilizers and fertilizer materials.[2] This information, together with certain supplemental material, is summarized and discussed in the present paper. With a few indicated exceptions the data relate to the territory comprising the Old Reich as encompassed by the national boundaries of 1937.

Plant-Food Consumption in Germany

Compared to the figure for the 1938–39 fertilizer year[3] the total consumption of nitrogen, P_2O_5, and K_2O as commercial fertilizer in Germany decreased 487,000 metric tons (17 per cent) during the first year of the war, owing chiefly to reduced supplies of P_2O_5 (Table I). The downward trend continued in subsequent years, though at a modified rate in 1940–41 to 1942–43 as a result of the sustained high use of potash, so that the total consumption of commercial plant food in 1944–45 is estimated to have been only 36 per cent of the quantity used in 1938–39. It will be noted that the consumption did not fall below the 1936–37 level until 1943–44.

The effects of the war on the relative consumptions of the three major plant foods are clearly shown by the changes in ratios of their use (Table I). Thus, in the pre-war period 1936–37 to 1938–39 the average use of nitrogen, P_2O_5, and K_2O was in the weight ratio 1:1.08:1.79. During the next four years, however, the consumption of P_2O_5 in relation to nitrogen was only 0.51 to 0.65 (average 0.58), while that of potash increased to 2.67. In the last two years of the war the consumption of nitrogen decreased at a much faster rate than did the consumption of P_2O_5 and of potash.

Germany's Plant Food Consumption Compared with that of the United States and Other Countries

Comparison of the plant food consumptions in Germany and the United States reveals

[1]The investigation was made for the Technical Industrial Intelligence Branch (formerly Technical Industrial Intelligence Committee), Joint Intelligence Objectives Agency, Field Information Agency, Technical. The findings, including much of the data of the present paper, are given in "German Fertilizers and Soil Fertility," by K. D. Jacob, FIAT Final Rept. No. 665, 63 pp. (Dec. 28, 1945), filed with the Office of the Publication Board, U. S. Department of Commerce, Washington, D. C., as No. PB 18777.

[2]The data were supplied mostly by Deutsche Ammoniak-Verkaufs-Vereinigung G. m. b. H., Am Park 7, Berlin-Schöneberg; Deutsches Kali-Syndikat G. m. b. H., Dessauer Str. 28–31, Berlin SW 11; Deutsche Superphosphat-Industrie G. m. b. H., Emser Str. 42, Berlin W 15; Dr. Heinrich Oster, Managing Director (retired), Stickstoff-Syndikat G. m. b. H., Ramholz über Vollmerz, near Schlüchtern; Rohphosphat-Gesellschaft m. b. H., Brandstwiete 2–4, Hamburg 11; Stickstoff-Syndikat G. m. b. H., Kufsteiner Str. 69, Berlin-Schöneberg; Thomasphosphatfabriken G. m. b. H., Gelfert Str. 55, Berlin-Dahlem.

[3]The German fertilizer year is June 1st to May 31st for nitrogen, May 1st to April 30th for P_2O_5, and May 16th to May 15th for K_2O.

TABLE I
CONSUMPTION OF COMMERCIAL PLANT FOOD IN GERMANY, 1936–37 TO 1944–45
(Metric tons)

Fertilizer Year	Nitrogen[1]	P_2O_5[2]	K_2O[3]	Total	Ratio, $N:P_2O_5:K_2O$
1936–37	571,700	631,000	955,563	2,158,263	1:1.10:1.67
1937–38	634,400	682,018	1,186,781	2,503,199	1:1.08:1.87
1938–39	718,200	762,582	1,309,843	2,790,625	1:1.06:1.82
1939–40	704,500	453,576	1,145,614	2,303,690	1:0.64:1.63
1940–41	674,700	360,945	1,392,064	2,427,709	1:0.53:2.06
1941–42	620,600	319,292	1,254,559	2,194,451	1:0.51:2.02
1942–43	506,100	329,614	1,348,983	2,184,697	1:0.65:2.67
1943–44	366,700	293,558	1,074,823	1,735,081	1:0.80:2.93
1944–45	120,000[4]	145,265	750,000[4]	1,015,265[4]	1:1.21:6.25

[1]Chemical nitrogen.
[2]Bone meal and chemically processed phosphates including basic slag.
[3]Potash salts.
[4]Estimated.

TABLE II
APPARENT CONSUMPTION OF COMMERCIAL PLANT FOOD PER UNIT AREA OF ARABLE LAND AND OF ARABLE LAND AND PERMANENT MEADOWS AND PASTURES IN CERTAIN COUNTRIES, RECENT 3-YEAR PRE-WAR AVERAGE[1]

Country	Years	Total Plant Food (N, P_2O_5, K_2O) Arable land, Kg. per ha.[2]	Arable land and permanent meadows and pastures, Kg. per ha.[2]	Ratio $N:P_2O_5:K_2O$
Netherlands	1937–39	336.6	144.4	1: 1.6: 2.7
Belgium	1935–37	177.9	111.9	1: 1.6: 1.2
New Zealand	1937–39	140.0	14.9	1:23.8: 1.6
Germany	1935–37	107.6	74.7	1: 1.0: 1.7
Japan	1935–37	97.3	62.7	1: 0.9: 0.4
Switzerland	1936–38	71.8	16.6	1: 6.2: 2.1
United Kingdom	1936–38	59.4	15.8	1: 3.6: 1.5
Denmark	1937–39	52.5	45.2	1: 1.7: 0.8
Norway	1936–38	43.7	35.6	1: 2.0: 2.1
Egypt	1937–39	37.6	....	1: 0.1:<0.1
France	1936–38	37.2	23.8	1: 2.3: 1.7
Sweden	1936–38	33.8	26.1	1: 1.8: 1.7
Peru	1937–39	31.7	5.3	1: 0.8: 0.5
Portugal	1937–39	29.9	....	1: 2.1: 0.1
Italy	1936–38	27.0	18.6	1: 1.9: 0.1
Australia	1936–38	21.7	17.4	1:19.9: 0.7
Finland	1936–38	20.3	15.3	1: 3.7: 1.7
Czechoslovakia	1936–38	17.3	12.4	1: 2.0: 1.1
Austria	1935–37	13.7	6.4	1: 2.5: 1.7
United States[3]	1937–39	9.9	9.6	1: 2.0: 1.1
Union of South Africa	1936–38	9.4	....	1: 4.6: 0.3
Poland	1936–38	7.6	5.6	1: 1.3: 3.1
Greece	1937–39	7.4	....	1: 1.4: 0.7
Canada	1936–38	3.0	2.6	1: 2.3: 1.5
Soviet Union	1937–38[4]	3.0	1.1	1: 2.8: 1.1
Hungary	1937–39	2.5	1.9	1: 4.4: 0.5
India, British	1936–38	0.2	....	1: 0.1: 0.1
Rumania	1937–39	0.15	0.12	1: 6.9: 0.8

[1]Data from K. G. Clark and Mildred S. Sherman, "Prewar World Production and Consumption of Plant Foods in Fertilizers," U. S. Dept. Agr. Misc. Pub. 593, 56 pp. (1946).
[2]Kilograms per hectare. Multiply by 0.89217 to convert to pounds per acre.
[3]Does not include Hawaii and Puerto Rico.
[4]Two-year average.

some interesting facts (Fig. 1).[4] In the immediate pre-war period the annual total consumption of commercial plant food in Germany averaged approximately 1.8 times that in the United States. Germany's much larger use of nitrogen and especially of potash —averaging about 1.8 and 3.2 times the respective United States consumptions—accounted for practically all of this difference, while the level of P_2O_5 consumption was nearly the same in both countries. The $N:P_2O_5:K_2O$ ratios averaged 1:1.08:1.79 and 1:1.94:1.02 for Germany and the United States, respectively.

During the war the trend in fertilizer use in Germany was markedly different from that in the United States. Thus, with the advent of hostilities the German consumption of total plant food, as well as of nitrogen and P_2O_5, began immediately to decline from the 1938–39 level, while in the United States successive new records were established each year for total plant food and for P_2O_5 and in nearly all years for nitrogen and K_2O, so that by 1943 the two countries were using practically the same quantity (2,400,000 short tons) of total plant food. By the end of the war, however, the situation was such that Germany was using only 44 per cent of the total plant food, 21 per cent of the nitrogen, and 12 per cent of the P_2O_5 used in the United States. Germany's use of K_2O, on the other hand, was still about 29 per cent higher than our consumption.

It is of interest to compare the apparent consumption of commercial plant food per unit area of agricultural land in Germany with the consumption in the United States and other countries. Such information has been compiled by Clark and Sherman[5] for

[4]The data for the United States are from A. L. Mehring, Hilda M. Wallace, and Mildred Drain, "Nitrogen, Phosphoric Acid, and Potash Consumption in the United States, by Years and by States, with Preliminary Figures for 1944," J. Am. Soc. Agron. **37**, 595–609 (1945).

recent pre-war years. A portion of the data for 28 of the 51 countries studied by Clark and Sherman are summarized in Table II which also shows the ratios of the plant foods consumed in the respective countries.

Among the countries listed in Table II, Germany ranked fourth and the United States twentieth in apparent consumption of commercial plant food per unit area of arable land. Germany was outranked only by the Netherlands, Belgium and New Zealand. Although the United States is far down the list in plant food use per unit of arable land for the country as a whole, it has been pointed out[6] that consumption is at comparatively high levels in certain of the individual areas

[5]K. G. Clark and Mildred S. Sherman, "Prewar World Production and Consumption of Plant Foods in Fertilizers," U. S. Dept. Agr. Misc. Pub. 593, 56 pp. (1946).

[6]F. W. Parker, J. R. Adams, K. G. Clark, K. D. Jacob, and A. L. Mehring, "Fertilizers and Lime in the United States: Resources, Production, Marketing, and Use," U. S. Dept. Agr. Misc. Pub. 586, 96 pp. (1946).

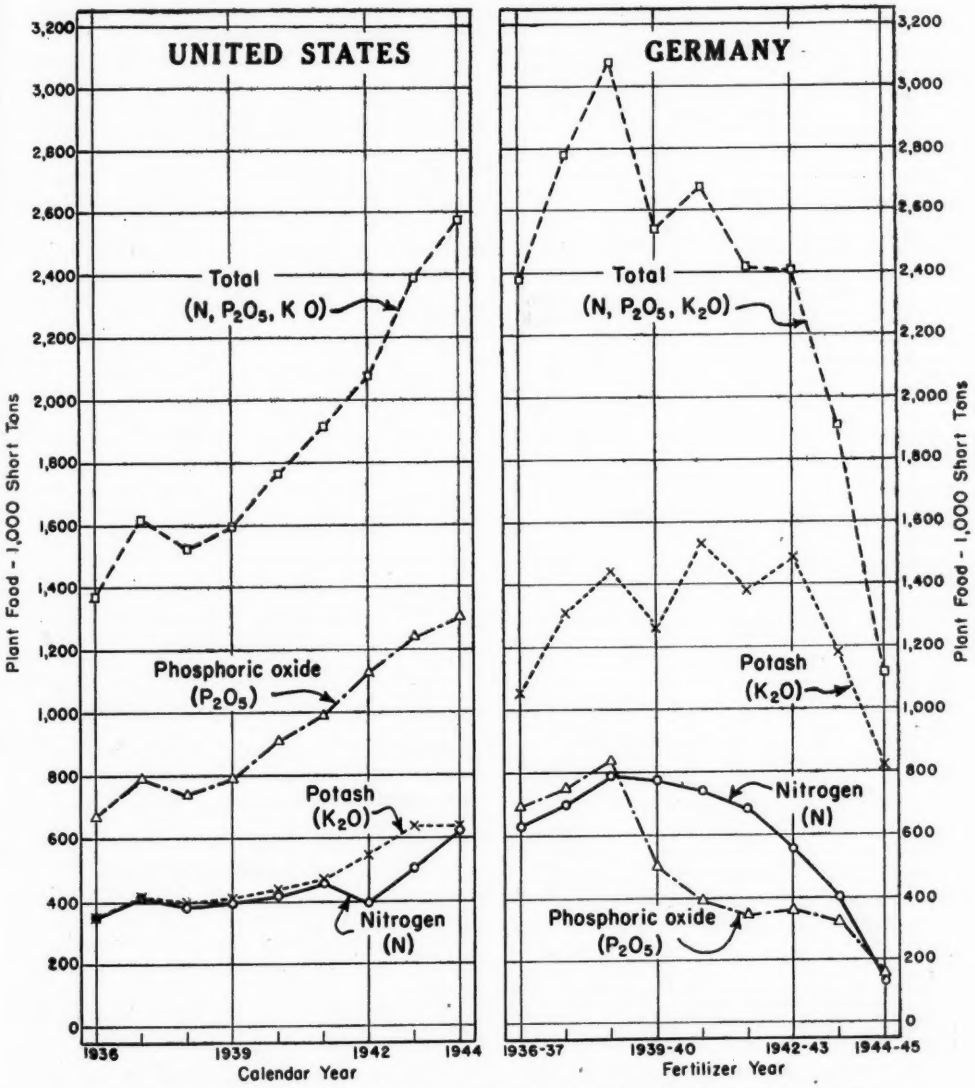


Fig. 1. Consumption of commercial plant food in the United States and Germany

and states. Thus, the consumption of commercial plant food in the New England and South Atlantic States exceeds 50 pounds per acre (56 kilograms per hectare), while in Florida, New Jersey, and Rhode Island it is more than 100 pounds per acre (112 kilograms per hectare).

Nitrogen in Germany

Data on the production of chemical nitrogen for fertilizer and for technical uses in the periods June 1st to May 31st of the years 1936–37 to 1944–45 are given in Table III.

TABLE III

PRODUCTION OF CHEMICAL NITROGEN FOR FERTILIZER AND TECHNICAL USES, 1936–37 TO 1944–45[1]

(Metric Tons of N)

Year[2]	Fertilizer	Technical use	Total
1936–37	673,657	83,449	757,106
1937–38	746,540	102,332	848,872
1938–39	838,177	117,367	955,544
1939–40	821,971	149,955	971,926
1940–41	830,842	188,946	1,019,788
1941–42	755,176	236,630	991,806
1942–43	651,837	289,549	941,386
1943–44	500,277	357,810	858,087
1944–45[3]	.....	.....	231,000

[1]Within the German "frontiers" of each year.
[2]June 1st to May 31st.
[3]First nine months only.

As the figures relate to production within the German "frontiers" of each year, they presumably include the output of plants in annexed territories. The total production of chemical nitrogen reached a maximum of 1,019,788 metric tons in 1940–41, an increase of only 6.6 per cent over the output in 1938–39. This is a surprisingly small increase in the production of a commodity of so great importance to military operations. Even when the changes in exports and imports (Table IV) are taken into consideration, the available supply of nitrogen in 1940–41 was no more than 13.3 per cent greater than that in 1938–39. It was not until the last year of the war that nitrogen production fell below the 1937–38 level. The very low output in 1944–45—only 231,000 metric tons in the first nine months—affords a striking example of Germany's industrial collapse.

Production of nitrogen for technical uses increased steadily until in 1943–44 it amounted to 357,810 metric tons or three times the 1938–39 output. On the other hand, production of fertilizer nitrogen reached a peak of 838,177 tons in 1938–39 but subsequently decreased to only 60 per cent of this figure in 1943–44. After 1940–41, the increases in technical nitrogen were accomplished entirely, or nearly so, at the expense of fertilizer nitrogen.

Based on the maximum performances of individual plants in any year, the wartime capacity for production of chemical nitrogen by all plants in the Old Reich (boundaries of 1937) amounted to 1,100,550 metric tons annually. It comprised 791,100, 166,450, and 143,000 tons in synthetic ammonia, byproduct ammonia, and cyanamide plants, respectively. Similarly, there was an additional capacity of 138,050 tons (synthetic ammonia 79,900, byproduct ammonia 15,650, cyanamide 42,500) in the territories annexed by Germany. With reference to the data of Table III it appears, therefore, that in no year did the actual production of chemical nitrogen in the Old Reich equal the sum of the best performances of the individual plants.

The aforementioned capacity figures for chemical nitrogen, based on the maximum outputs of individual plants, do not necessarily reflect either the actual or the potential capacities for production of such nitrogen. One important factor in this situation is the ease with which high-pressure synthesis plants can be shifted from ammonia production to manufacture of certain other chemicals, for example, liquid fuels. Estimates of the prewar productive capacity for chemical nitrogen in the Old Reich range as high as 1,500,000 metric tons annually, of which as much as 600,000 tons may have been converted to other purposes before and during the war. It has been estimated by one individual who has been closely associated with the industry for many years that, as a result of plant destruction and damage, the capacity for production of chemical nitrogen in Germany did not exceed 550,000 tons annually as of September, 1945.

Excluding one plant (I. G. Farbenindustrie, Heydebreck, near the Polish border) having a rated annual capacity of 100,000 tons of nitrogen, which had not been completed by the end of the war, Fogler and Gregory[6a] state that prior to bombing, the capacity for production of synthetic ammonia within the Old Reich borders is estimated to have been 824,000 metric tons of nitrogen per year, including 365,000 and 270,000 tons in the I. G. plants at Leuna and Oppau, respectively. This was exclusive of the large capacity at

[6a]Mayor Fogler and A. S. Gregory, "Current Status of the German Synthetic Nitrogen Fertilizer Industry," Office of the Publication Board, U. S. Department of Commerce, No. PB 1764, 37 pp. (Aug. 14, 1945).

(Continued on page 28)

The American Chemical Society

Abstracts of Some of the Papers Presensed at the Meeting of the Division of Fertilizer Chemistry at Chicago, Ill., September 9-11, 1946

(Other Abstracts were published in the issue of September 7, 1946)

Regarding Acidulating Soils with Sulphur

Arthur M. Smith, Stamford, Conn.

Sulphur, a reagent in the fertilizer industry, and long known as an essential plant food element, was for many years relegated to the status of an incidental carrier. Even today the sulphur requirements of plants and soils with relation to location and climate are inadequately understood and should be the subject of additional and more careful research.

Passing over with brief mention the many known uses of sulphur in service to agriculture, it is the purpose of this paper to focus attention on the demonstrated and potential use of sulphur to acidulate localized areas in neutral, calcareous, and alkaline soils as a means of bringing into availability appreciable amounts of other plant food elements in such soils. Only since the development of an appreciation of pH, following methods for determining and for correlating it with crop yields after overliming, has the possibility of benefits from a practice of acidulating non-acid soils been evident.

At present soil acidulation is a pertinent subject under investigation in several states. It is of importance to chemists and others in the plant food industry. This paper discusses in some detail experimental work and commercial practice in Texas and in other states, in which non-acid soils constitute a major or an appreciable part of the crop acreage.

Manganese in Agriculture. A General Review of Experimental Data, with Discussions of Practical Aspects on Its Use as a Fertilizer

J. F. Wischhusen, Manganese Research & Development Foundation, Cleveland 10, Ohio

The salient historical reviews establishing the essential nature of manganese to all plant and animal life, and some biological functions are enumerated. Kodachrome slides of acute manganese deficiency symptoms are shown on apricot, cherry, lemon, onions, peanuts, soybeans, tobacco, sugarbeets, walnuts, wheat. Toxicity symptoms are described.

The role which manganese probably plays in microbiological activities is mentioned. Practical aspects dealing with manganese deficiency causes are discussed with estimates about quantities removed by cropping, through exports and sewage.

Practices of manganese applications in Florida and Michigan are set forth. Field demonstrations on South Caroline crops are reviewed, where manganese applications singly and together with boron, magnesium, iron zinc, cobalt, copper, and sulphur showed definite benefits. Conclusions are that manganese is mined from soils, and that optimum crop production on soils that are expected, to produce more in future than in the past favors greater, more extensive applications.

The improvements of apparently normal crops and the correction of invisible subacute deficiencies are dealt with under "unsolved problems."

The view is expressed that manganese contents of soils and plants are not directly related to manganese requirements by animals; that each form of life is concerned only with its own growth and reproduction, so that manganese requirements by soil microbiology is a separate problem from the requirement of manganese by plants, and again by animal life. The manganese requirements of every form of life studies and consideration.

The Effects of Several Minor Elements on Crops Produced on Michigan Organic Soil, as Measured by Deficiency Symptoms, Yields, and Composition

Paul M. Harmer and Erwin J. Benne, Michigan State College, East Lansing, Mich.

Michigan's organic soils are likely to show vegetative deficiency symptoms indicating lack of one or more of five of the so-called minor elements. They generally respond to an application of the deficient element by a marked increase in yield. Different crops vary considerably in the amount of response shown to a given minor element. Deficiency symptoms and response of different crops appear to be correlated to some extent with drainage conditions, seasonal climate, soil

(Continued on page 28)

THE AMERICAN FERTILIZER
ESTABLISHED 1894
PUBLISHED EVERY OTHER SATURDAY BY
WARE BROS. COMPANY
1900 CHESTNUT ST., PHILADELPHIA 3, PA.

A Magazine international in scope and circulation devoted exclusively to the Commercial Fertilizer Industry and its Allied Industries

PIONEER JOURNAL OF THE FERTILIZER INDUSTRY

A A WARE, Editor
C A WHITTLE, Associate Editor
K. F WARE Advertising Manager

JOHN C. BAKER, Washington Editor
1129 Vermont Ave., Washington 5, D.C

E. A. HUNTER, Southern Advertising Manager
2246 E. Lake Road, N. E.,
Atlanta, Ga.

REPRESENTATIVE
WILLIAM G. CAMPBELL
123 W. Madison St., Chicago, Ill., Phone—Randolph 4780

ANNUAL SUBSCRIPTION RATES

U. S. and its possessions, also Cuba and Panama	$3.00
Canada and Mexico	4.00
Other Foreign Countries	5.00
Single Copy	.25
Back Numbers	.50

THE AMERICAN FERTILIZER is not necessarily in accord with opinions expressed in contributed articles that appear in its columns. Copyright, 1946, by Ware Bros. Company.

Vol. 105 SEPTEMBER 21, 1946 No. 6

Principal Articles in This Issue

FERTILIZERS IN WARTIME GERMANY, *by K. D. Jacob* 7

THE AMERICAN CHEMICAL SOCIETY *Abstract of Fertilizer Papers* 11

Ordnance Plants to Produce UNRRA Nitrogen 12

August Tax Tag Sales 13

Fertilizer Recommendations for Southern Tobacco 14

FERTILIZER MATERIALS MARKET:

New York 15

Philadelphia 15

Chicago 17

September Cotton Report 17

International Superphosphate Manufacturers Association 18

July Superphosphate Figures 20

Ordnance Plants to Produce UNRRA Nitrogen

The War Department has announced that arrangements have been made with nine commercial concerns to operate 15 ordnance nitrogen plants for the production of nitrate fertilizers to be used in war-ravaged countries. It is expected that these plants will produce about 70,000 tons of ammonium nitrate per month.

Shipment overseas will be under the supervision of the Quartermaster Corps. The assignment of the different plants to specific companies are as follows:

Ammonium Nitrate

The Silas Mason Company is to operate the plants at the Milan Arsenal, Milan, Tenn.; Savanna Ordnance Depot, Savanna, Ill.; Ravenna Arsenal, Apco, Ohio; and Illinois Ordnance Plant, Carbondale, Ill.

The Emergency Export Corporation, Kansas City, Mo., to operate plants at the Cornhusker Ordnance Plant, Grand Island, Neb.; the Iowa Ordnance Plant, Burlington, Iowa; and the Nebraska Ordnance Plant, Fremont, Neb.

Aqueous Ammonium Nitrate

The Hercules Powder Company to operate plants at the Sunflower Ordnance Works, Lawrence, Kans.; and the Radford Ordnance Works, Radford, Va.

Ammonium Nitrate and Nitric Acid

E. I. du Pont de Nemours and Co. to operate plants at the Joliet Arsenal, Joliet, Ill.; and the Indiana Arsenal, Charlestown, Ind.

The Liberty Powder Company, East Alton, Ill., to operate the plant at the Holston Ordnance Works, Kingsport, Tenn.

Anhydrous Ammonia

The Hercules Powder Company to operate the Missouri Ordnance Works, Louisiana, Mo.

Atmospheric Nitrogen Corporation, New York, to operate Ohio River Ordnance Works, Henderson, Ky.

Heyden Chemical Corporation to operate the Morgantown Ordnance Works, Morgantown, W. Va.

In addition to the above, anhydrous ammonia will be produced at the Cactus Ordnance Works, Ettel, Tex., and ammonium nitrate at the Wabash River Ordnance Works, Dana, Ind., by companies still to be selected.

N. F. A. Southern Meeting

The fall meeting of the National Fertilizer Association will be held at the Atlanta Biltmore Hotel, Atlanta, Ga., on Tuesday, November 12th and Wednesday, November 13th. The Board of Directors and the various Association Committees will meet on November 11th. Details of the program will be announced later.

Allied Chemical & Dye Purchases Ohio Nitrogen Plant

The Solvay Process Company, a subsidiary of Allied Chemical & Dye Corporation, has purchased from the Government the nitrogen plant at South Point, Ohio.

This plant was constructed and operated for the Government during the war by Atmospheric Nitrogen Corporation, a subsidiary of Solvay, and is now being operated by Solvay for the production of ammonia and ammonium-nitrate-ammonia solutions.

The products of the new plant will be distributed by the Barrett Division of Allied Chemical, which also handles Arcadian nitrate of soda and other products of the Allied plant at Hopewell, Va.

Roop Elected Treasurer of Davison Chemical Corpation

M. C. Roop has been elected treasurer of Davison Chemical Corporation, succeeding M. H. McCord. Mr. Roop who was formerly secretary and controller of the company, will continue to hold the office of secretary, and W. B. McCloskey, his former assistant, has been named controller.

Other appointments include J. E. Hardesty, to be assistant secretary and assistant treasurer, and F. J. Griffin, formerly with the Reconstruction Finance Corporation, to be assistant controller.

Air Freight Helps to Open New International Phosphate Mine

The opening of the new phosphate mine of International Minerals & Chemical Corporation at Mulberry, Fla., which had been scheduled for this month, was blocked by the lack of four small pieces of equipment.

On September 5th a plane of the U. S. Airlines, Inc., left Chicago carrying these four speed-reducers, weighing about three tons, and eight hours later they were rushed from the landing field by truck to the new processing plant.

James A. Barr, chief engineer at International's headquarters in Chicago, now states that the entire plant at Mulberry was able to begin operation within ten days from the receipt of the missing equipment.

Construction of the operation which is known as the "Achan" mine was started early this spring and was finished during August.

Scar-Lipman Opens New York Office

Scar-Lipman & Company, Inc., brokers and dealers in fertilizer materials and chemicals, have opened offices in the Graybar Building, 420 Lexington Ave., New York 17, N. Y. This will enable them to render more prompt and efficient service to their customers. The former offices of the Company at Irvington, N. J. have been discontinued and all business will be handled from the New York office.

August Tax Tag Sales

Fertilizer tax tag sales totaled 367,185 tons during August according to the figures compiled by the National Fertilizer Association. This is almost identical with the figure of 367,537 tons in July but is an increase of 22 per cent over August, 1945. Increases were recorded in eight of the eleven Southern states and in three of the five Midwestern states reporting.

	Equivalent Tons		
	August		Jan.-Aug.
	1946	1945	1946
Virginia	54,921	50,020	508,916
North Carolina	32,546	15,840	1,238,132
South Carolina	17,960	10,790	692,521
Georgia	13,794	14,445	932,742
Florida	46,351	44,129	618,077
Alabama	11,150	15,000	711,650
Tennessee	25,994	14,450	272,419
Arkansas	6,700	2,000	132,800
Louisiana	2,005	3,050	138,618
Texas	8,904	3,500	225,705
Oklahoma	2,950	1,950	35,748
Total South	223,275	175,174	5,507,328
Indiana	61,207	44,423	447,865
Illinois	37,400	25,400	225,883
Kentucky	19,705	9,188	260,666
Missouri	18,740	40,183	193,211
Kansas	6,858	7,300	40,085
Total Midwest	143,910	126,494	1,167,710
Grand Total	367,185	301,668	6,675,038

Fertilizer Recommendations for Southern Tobacco

The Agronomy Tobacco Work Conference held their annual meeting at Tifton, Ga., on June 26th. Representatives were present from Virginia, North Carolina, South Carolina, Georgia and Florida. After a thorough discussion of the problems facing the growers of flue-cured tobacco and the available supplies of fertilizer for the 1946–1947 season, the conference adopted the following recommendations for fertilization of flue-cured tobacco grown on average soils in 1947 in the above-mentioned states.

Analyses of Mixtures and Rates of Application

1. *For Heavy or More Productive Soils.* Three per cent total nitrogen, 9 to 10 per cent available phosphoric acid, and 6 to 12 per cent potash, to be applied at rates of 800 to 1,000 pounds per acre.

2. *For Light or Less Productive Soils.* Three per cent total nitrogen, 9 to 10 per cent available phosphoric acid, and 6 to 12 per cent potash, to be applied at the rates of 800 to 1,200 pounds per acre.

3. *Reduction of Nitrogen.* Where tobacco has a tendency to be rough and of poor quality, the nitrogen may be reduced to 2 per cent. For such conditions, 2 per cent total nitrogen, 10 to 12 per cent available phosphoric acid, and 6 to 12 per cent potash is suggested, to be applied at rates of 800 to 1,000 pounds to the acre.

4. *Additional Potash.* Experiments indicate that potash has an important influence on yield and quality in flue-cured tobacco. It is, therefore, suggested that when less than 50 pounds of K_2O (6 per cent potash in an 800 pound to the acre application) is applied at planting time, or where potash deficiency is anticipated or known, that potash to the extent of 50 to 120 pounds of K_2O (approximately 100 to 250 pounds of sulphate of potash equivalent) to the acre be applied as additional side-dressings within 20 days after transplanting. High chlorine salts should not be used as side-dressers.

5. *Additional Nitrogen.* Where the need of additional nitrogen is indicated, it may be applied, preferably with potash, as a side-dresser. The application should not exceed 15 pounds of N per acre.

6. *Method of Application.* Experiments indicate that fertilizers applied so as to come in direct contact with the plant roots cause loss of plants and retard early growth. It is, therefore, suggested that fertilizers be placed in bands 3 to 4 inches to the sides of the row at the approximate level or slightly below the root crowns and the plants be set between these bands, or that the fertilizer be *thoroughly* mixed with the soil in the furrow before bedding. Where proper machinery is not available for side placement, it is suggested that 60 per cent of the fertilizer be applied at planting and the remainder as a side-dressing approximately 20 days after setting.

The above analyses may be modified, provided the approximate ratios are maintained and the recommended sources of plant food are used.

Where more than 6 per cent potash is used, farmers are cautioned to apply fertilizer in bands or mix thoroughly with soil to prevent plant injury.

These recommendations are based on a population of approximately 5,000 plants per acre. Where plants are spaced closer or extreme high topping is practiced, rates may be increased.

Sources of Plant Food

1. *Nitrogen.* One-third of the nitrogen should be derived from high grade organic

(Continued on page 24)

BRADLEY & BAKER

FERTILIZER MATERIALS - FEEDSTUFFS

AGENTS - IMPORTERS - BROKERS

155 E. 44th Street
NEW YORK

BRANCHES
Clinton St. & Danville Ave. Baltimore, Md.
505 Royster Building Norfolk, Va.
Barnett Bank Building Jacksonville, Fla.
504 Merchants Exchange Bldg., St. Louis, Mo.

FERTILIZER MATERIALS MARKET

NEW YORK

Inquiry Slackens on Most Materials as Manufacturers Complete Contracts for Season's Requirements. Feed Industry Taking all Available Organics. Sulphate of Ammonia in Larger Supply but even Larger Demand. No Improvement in Phosphate Rock Output.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, September 16, 1946

During the past two weeks there has been a definite slackening of buying interest in the fertilizer materials market, with the exception of sulphate of ammonia, in which inquiry continues heavy. The established fertilizer manufacturers have apparently covered their requirements for the new season in most instances, whereas some of the new plants are still awaiting allocations of various materials. There is still considerable confusion concerning price schedules of the various organics but in the meantime all supples made available continue to go directly to the feed trade.

Foreign inquiry has also fallen off as the quotas for those countries, who have been allocated supplies, have been fulfilled for the present period. There is a complete absence of foreign offerings on fertilizer materials in the market at present.

Sulphate of Ammonia

Byproduct production from the steel industry continues to increase, but very little material is available for sale beyond recent contract commitments. Inquiry remains active from all sections, and it seems probable that the short supply position will continue through the current fertilizer year.

Nitrate of Soda

This market remains very firm, with stocks in this area at adequate levels. Shipments to fertilizer manufacturers are showing a normal seasonal decline.

Organic Materials

Considerable trading has been accomplished in menhaden scrap, but activity is confined to the animal feed manufacturers. Feeding bone meal, although decontrolled, remains firm at $65 per ton, f.o.b. plant. The possibility of importing organics is not favorable in the near future, in view of anticipated price restrictions.

Superphosphate

Continuing demand has tended to maintain the present tight market situation. No easing of available supplies is anticipated before an increased phosphate rock production is attained.

Phosphate Rock

Inventories at the mines remain low, due to continued heavy call from acidulators. Hope for increased production has not materialized as yet.

Potash

Contracts have now been made by all major producers with previously established manufacturers, and it is expected that CPA will complete allocations to new manufacturers in the near future. The increasing shortage of transportation space is causing increasing concern, but at this time shipments are moving as scheduled.

PHILADELPHIA

Some Mixing Plants Closed for Supplies of Materials. Shortage in All Lines Continues. Phosphate Rock Shipments Slow.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, September 16, 1946

Scarcity of raw materials still exists and some of the smaller mixing plants have closed down until they can get relief. Sulphate of ammonia and potash are much in demand, while delayed phosphate rock shipments are said to be upsetting the suerphosphate schedules. The demand for organics is almost pathetic, and it is feared that the inorganic nitrogen shortage may become quite serious, should the government not return in time the nitrogen material, or its equivalent, currently borrowed for export.

Sulphate of Ammonium.—The supply position is exceedingly tight, and while the figures seem to show an increase in domestic production, the trade in general is not receiv-

A Complete Service

THE strategic factory locations of The American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

We manufacture all grades of Commercial Fertilizers, Superphosphate, Agrinite Tankage, Bone Black, Bone Black Pigments (Cosmic Black), Bone Ash, Bone Oil, Dicalcium Phosphate, Monocalcium Phosphate, Gelatin, Agricultural Insecticides (including Pyrox, Arsenate of Lead, Calcium Arsenate, etc.), Trisodium and Disodium Phosphate, Phosphorus, Phosphoric Acid, Sulphuric Acid, Ammonium Carbonate, Ammonium Fluosilicate, Magnesium Fluosilicate, Potassium Fluosilicate, Phosphorus Pentasulphide, Phosphorus Sesquisulphide (lump), Zinc Fluosilicate, Salt Cake; and we are importers and/or dealers in Nitrate of Soda, Cyanamid, Potash Salts, Sulphate of Ammonia, Raw Bone Meal, Steamed Bone Meal, Sheep and Goat Manure, Fish and Blood. We mine and sell all grades of Florida Pebble Phosphate Rock.

FACTORIES

Alexandria, Va.
Baltimore, Md.
Buffalo, N. Y.
Cartaret, N. J.
Cayce, S. C.
Chambly Canton, Quebec, Can.
Charleston, S. C.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
Greensboro, N. C.
Havana, Cuba
Henderson, N. C.
Montgomery, Ala.
Nat. Stockyards, Ill.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont., Can.
Savannah, Ga.
Searsport, Maine
South Amboy, N. J.
Spartanburg, S. C.
Wilmington, N. C.

The AMERICAN AGRICULTURAL CHEMICAL Co.

50 Church Street, New York 7, N. Y.

SALES OFFICES

Alexandria, Va.
Baltimore, Md.
Buffalo, N. Y.
Cartaret, N. J.
Charleston, S. C.
Cincinnati, Ohio
Cleveland, Ohio
Columbia, S. C.
Detroit, Mich.
Greensboro, N. C.
Havana, Cuba
Henderson, N. C.
Houlton, Me.
Laurel, Miss.
Montgomery, Ala.
Montreal, Quebec, Can.
National Stockyards, Ill.
New York, N. Y.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont., Can.
Savannah, Ga.
Spartanburg, S. C.
Wilmington, N. C.

ing what they require, and some mixers express the fear that they will get nothing at all for the coming season.

Nitrate of Soda.—Stocks are under normal and little movement for fertilizer is observed at this time.

Blood, Tankage, Bone.—Situation remains the same in that there is almost no supply for fertilizer use. These organics go almost exclusively to the feeding trade. There seems also to be confusion as to present OPA requirements.

Castor Pomace.—No sales in evidence.

Fish Scrap.—Catch is reported as fair, but the feeding trade gets the goods.

Phosphate Rock.—The superphosphate manufacturers are calling for supplies faster than the mines can ship, and it said that operations are accordingly being held up in some of the fertilizer plants. It is reported, however, that exports are considerably ahead of last year.

Superphosphate.—Market position is very tight, and production said to be greatly restricted by delayed delivery of raw rock.

Potash.—Demand is exceedingly brisk, with most mixers claiming to be very short of their requirements.

CHICAGO

No Fertilizer Organics Being Offered. Little Feed Material Offered at Current Ceilings.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, September 6, 1946

No fertilizer tankage, blood, bone meal or nitrogenous is being offered. Inquiry continues for any deliveries and for any kind of material. Prospects for improvement cannot be looked for until livestock receipts increase.

While the old ceilings for feed prices are quoted, the large producers state they have nothing to offer and very little business is reported.

September Cotton Report

A 9,171,000 bale cotton crop for the United States is forecast this year by the Crop Reporting Board of the Bureau of Agricultural Economics, based on information as of September 1. This is 119,000 bales, or 1.3 per cent less than the August 1 forecast and compares with 9,015,000 bales produced in 1945 and 12,553,000 bales for the 1935–45 average.

Prospective lint yield per acre is computed at 247.6 pounds, 3.4 pounds below that of last year, but 4.4 pounds above average.

The report from the Bureau of Census shows 531,503 bales of cotton ginned from the crop of 1946 prior to August 1, compared with 461,896 bales for 1945 and 576,999 bales for 1944.

PRODUCTION (GINNINGS) 500 lb. gross wt. bales

STATE	Average 1935–1944	1945 Crop	1946 Crop Indicated Sept. 1
	Thous. bales	Thous. bales	Thous. bales
Missouri	365	180	300
Virginia	27	16	18
North Carolina	612	428	490
South Carolina	773	664	700
Georgia	956	669	640
Florida	22	8	7
Tennessee	514	466	540
Alabama	1,016	931	850
Mississippi	1,757	1,560	1,250
Arkansas	1,375	1,042	1,320
Louisiana	656	387	290
Oklahoma	596	285	300
Texas	3,137	1,794	1,775
New Mexico	112	106	116
Arizona	187	117	131
California	430	353	431
All Other	18	9	13
United States	12,553	9,015	9,171
Amer. Egypt	33.6	4.1	2.0

Manufacturers' Sales Agents for **DOMESTIC**

Sulphate of Ammonia

Ammonia Liquor :: Anhydrous Ammonia

HYDROCARBON PRODUCTS CO., INC.

500 Fifth Avenue, New York

International Superphosphate Manufacturers Association

The International Superphosphate Manufacturers Association resumed its activities at a meeting in Paris on July 9th and 10th. In attendance were delegates from Belgium, Denmark, Egypt, France, Holland, North Africa, Norway, Palestine, Sweden, Switzerland, Great Britain and the United States.

Most of the pre-war members in allied and neutral countries have already resumed their membership, but the association decided to defer the question of admitting members from Axis countries until the peace treaties have been negotiated.

The publication of statistical information covering the superphosphate industry is being resumed and the association plans to begin experimental work (formerly carried on in Hamburg) at some suitable place.

The following officers were elected for 1946–47: A. Waller (Holland), *president*; R. Audouin (France), F. G. Clavering Fison (Great Britain), H. Stevenius Hielsen (Denmark), Robert Standaert (Belgium), *vice-presidents;* F. Lavaste (France) and P. Wonsild (Denmark), *honorary vice-presidents;* R. M. Collins, *secretary*.

A. N. Gray, who had been secretary of the association since its foundation, has resigned on account of ill health.

The offices of the organization are located at 44 Russell Square, London, W. C. 1, England.

Commercial Fertilizer Used on Cotton

According to figures issued by the National Fertilizer Association, fertilizer used in the cotton states totaled about 8,900,000 tons in 1945 and increased 76 per cent from the 1935–39 average, but fertilizer used on cotton, totaling 1,480,000 tons in 1946, increased only 3 per cent. The ratio of fertilizer used on cotton to total fertilizer used in the cotton states declined from 28 per cent in the 1935–39 period to 17 per cent in 1946.

Fertilizer was used on only 38 per cent of the acres harvested in the 1935–39 period compared with 49 per cent in 1946. The percentage varied in the different states in 1946 from 99 per cent of the acres in many southeastern states to only 5 per cent in Oklahoma and Texas.

CASE HISTORY No. 8

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON
(Per Ton)

	Burlap Bags	Paper Bags
Container cost	$3.25	$2.80
Labor cost	.71½	.18½
Total bag and labor cost	$3.96½	$2.98½
Saving, paper over fabric		$0.98

CLASS OF PRODUCT PACKED

CEMENT	FERTILIZER
CHEMICALS ✔	FOOD
FEEDSTUFFS	MISCELLANEOUS

PRODUCT CHARACTERISTICS

ABRASIVE	GRANULAR
CORROSIVE	HEAVY
DELIQUESCENT	HYGROSCOPIC
FLUFFY	LIGHT
FREE-FLOWING ✔	VISCOUS ✔

ST. REGIS BAG PACKAGING SYSTEMS are made in a variety of capacities, speeds, and manpower requirements to suit specific products and plant layouts. Machines are available in types to meet the special characteristics of a wide range of products, with filling speeds as high as twenty-four 100-lb. bags per minute — with one operator.

SOME "EARTHY" FACTS

...about Packaging Economy

Fuller's Earth a "Natural" for St. Regis Packaging System: —
....Container Costs Cut...14%
....Labor Costs Cut.....75%
....Production Potential "Upped".....180%

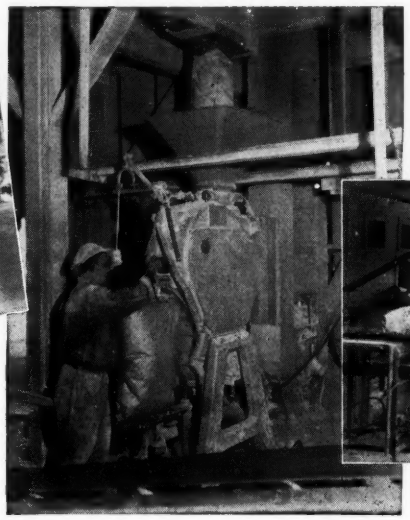
Whether you are packaging chemicals, foods, fertilizer or ck products, a St. Regis Packaging System individually signed to suit your product will effect worth-while econ- ies. This eighth in a series of Multiwall success stories lates the experiences of the Floridin Company, Warren, , processors of fuller's earth under the trade names of oridin and Florex.

In 1945 this company installed a St. Regis 301-FB packer d began using 50-lb. Multiwall paper valve bags instead 125-lb. burlap bags. Not only was there a saving of 45¢ ton in container cost after switching to Multiwalls but re was also an appreciable reduction in labor costs.

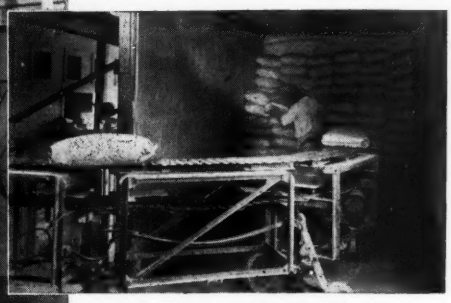
Under the old system eleven men were required to pack- 100 tons per day in 125-lb. burlap bags. With the Regis Packaging System, labor costs dropped from 71½¢ per ton to 18½¢ . . . a saving of 75%. Company officials estimate that with a battery of four St. Regis packers and a crew of only eight men they will be able to increase production to 280 tons per day . . . *an increase of 180%.*

For the full picture story on how the Floridin Company reduced container costs, increased production potential, and cut labor costs by the installation of a St. Regis Packaging System and streamlined mechanized handling equipment, mail the coupon. You will find the same basic principles applicable to *your* business.

filled Multiwalls are dropped conveyor belt which carries to a freight car.



One man operates this St. Regis packer, which simultaneously fills and weighs 50-lb. Multiwall valve bags.



This flexible, portable conveyor delivers filled Multiwalls to the box car. Note flat, compact manner in which Multiwall valve bags stack.

St. Regis MULTIWALL PAPER BAGS

ST. REGIS SALES CORPORATION
(Sales Subsidiary of St. Regis Paper Company)

W YORK 17: 230 Park Ave. **CHICAGO 1: 230 No. Michigan Ave.**
LTIMORE 2: 2601 O'Sullivan Bldg. **SAN FRANCISCO 4: 1 Montgomery St.**

ail this coupon for the complete story

Allentown Birmingham Boston Cleveland Dallas Denver
Detroit Franklin, Va. Los Angeles Nazareth, Pa. New Orleans
St. Kansas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo
IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.

Without obligation, please send me full details regarding "Case History" No. 8, outlined above.

NAME_____

COMPANY_____

ADDRESS_____

July Superphosphate Figures

Production of superphosphates of all kinds during July totaled 657,237 tons (basis 18 per cent A. P. A.), an increase of 5 per cent over June, According to the figures of the U. S. Bureau of Census. Shipments increased to 598,370 tons, a rise of 17 per cent over June, and stocks on hand at the end of the month in- creased 10 per cent to 710,845 tons. The production increases were distributed over all types—normal, concentrated, and base goods—for the first time in several months.

	Normal 18% A. P. A.	Concentrated 45% A. P. A.	Base 18% A. P. A.
Production			
July, 1946	596,482	23,015	3,217
June, 1946	565,977	22,910	1,756
July, 1945	611,388	21,251	2,332
Shipments and Used in Producing Plants			
July, 1946	538,061	23,867	641
June, 1946	459,632	19,623	1,699
July, 1945	568,435	21,136	1,424
Stocks in Hand			
July 31, 1946	593,568	44,976	4,837
June 30, 1946	527,926	45,790	2,261
July 31, 1945	761,938	28,563	3,234

Effect of Fertilizer on Cotton Fibre Quality

Questioning the reports of several research workers that the use of different chemical fertilizers apparently had no significant effect on cotton fibre quality, research workers of Louisiana State University undertook to remove all questionable factors from methods employed.

Thirty-two small plots were laid off, 18 inches of soil from all these dug up, hauled to a pile, thoroughly mixed, then replaced on the plots. A pure line strain of cotton was planted, and fibre from balls from flowers that opened the same day was used for comparison. The fibre length was measured with Hertel's fibrograph machine in the fibre laboratory at Knoxville, Tenn., and the strength of fibres was determined with Presley's strength tester in the same laboratory.

H. B. Brown says in the Annual Report of the Louisiana Agricultural Experiment Station: "Our results show consistent and significant differences between the staple length of fibres from well-fertilized and non-fertilized or poorly fertilized plots. There was a difference in some cases of 5.1 thirty-seconds of an

POTASH
TRONA
SALTS

AMERICAN POTASH and CHEMICAL CORPORATION
122 East 42nd St. New York City

Pioneer Producers of Muriate in America

Branch Offices
214 Walton Building
ATLANTA 3, GEORGIA
231 South La Salle Street
CHICAGO 4, ILLINOIS
609 South Grand Avenue
LOS ANGELES 14, CALIF.

MURIATE and SULPHATE of POTASH

Plant foods are urgently needed to grow the crops which feed our nation and our armed forces.

Our plant at Trona, Calif., is operating at capacity to provide supplies of these essential plant foods, and other materials needed in the national effort.

Manufacturers of Three Elephant Borax and Boric Acid

See page 25

BEMIS MINUTE MOVIES
for Shippers who want to save time and money
"Ferdinand Fertilizer Wins Top Money"
Scenario: Ferdinand Fertilizer is a high-class fellow...a skilled workman. He's a "special fertilizer" employed by gardeners, nurseries, golf courses, etc. This important fellow must arrive at work in tip-top condition. If Ferdinand allows his clothes to become torn or soaked with rain, he's ruined. He looks and looks for the right clothes to wear, and then...
Happy Ending: Success! Ferdinand Fertilizer now dresses up and keeps in perfect condition in Bemis Waterproof Laminated Textile Bags. (They're mighty economical too for such smart appearance and the protection they give.) Ferdinand commands top money . . . is in wide demand . . . and everybody's happy now.
BEMIS Waterproof BAGS

PRE-TESTS STOP PROTESTS! Bemis Waterproof Laminated Textile Bags head off complaints because they are tested *before* they are put to work. Their strength and tear-resistant, puncture-resistant qualities are pre-proved for you. And their economy is attested by scores of users.

This Bemis Waterproof Bag is light in weight, yet is the strongest shipping bag made. It assures low-cost protection against sifting, breakage, caking, escape of odors, and many other common shipping complaints. Empty or filled, it saves storage space.

Your special fertilizers packed in Bemis Waterproof Bags command top prices — and bring you repeat business.

Write today for a copy of "Seven Facts About Low-Cost Protective Packaging"

BEMIS BRO. BAG CO.
WATERPROOF DEPARTMENT
408-N PINE ST., ST. LOUIS 2, MO.
Plants and Offices in 33 Principal Cities

inch in the mean staple length and 4.0 thirty-seconds in the upper half mean.

"It was observed, too, that there was a very consistent shortening in fibre length as the season progressed. Fibre developed from the second half of the season 2 to 5.6 thirty-seconds of an inch shorter than in the early season bolls, and was finer and weaker.

"The better fertilizer not only induced longer, but stronger and coarser fibre and a higher fibre index."

Farm Profits Increasing

Preliminary estimates made by the U. S. D. A. indicate that an increase in cash receipts from farm marketings in 1946 may be as much as 10 per cent over the 20,781 million dollars received last year. Gross farm income will probably show a similar gain, but with larger expenditures for feed, labor and other production items, operator's net income is likely to show a slightly smaller relative increase.

Phosphates on Texas Grasses

Superphosphate greatly increased either the yield or the phosphoric acid content of the crop in Texas experiments reported in Bulletin No. 672 of the Texas Experiment Station by J. F. Fudge and G. S. Fraps.

On phosphorus-deficient soils small applications of superphosphate often produced large increases in yields accompanied by only small increases in percentage of phosphoric acid in the dry matter. Larger applications produced larger increases both in yield and in percentage of phsophoric acid, raising the percentage well above the minimum required for range animals.

Different species of grasses differed in their capacity to use soil phosphates. These differences were reduced by the application of superphosphate, and a large part of the phosphoric acid added in superphosphate was recovered in the crops.

According to the bulletin, ground rock phosphate "increased yields in a few instances, but had little effect upon the percentage of phosphoric acid in the dry matter. Increasing the amount of rock phosphate, the period of contact with the soil, or the fineness of grinding did not cause any further increases in yield or percentage. Ground rock is not to be recommended for use on pasture."

Fertilizer Increases Oat Yield in Arkansas

Fertilizer increased the oat yield three and one-half times for R. A. Young, Dover, Arkansas, according to County Agent Carl E. Rose. Mr. Young planted oats last fall on land where no fertilizer was applied and on land where 100 pounds of 48 per cent superphosphate per acre were applied. To part of the area phosphated, 100 pounds of ammonium nitrate per acre were applied as a top-dressing. It was easy to tell where the phosphate and nitrogen were applied after the first three days, Mr. Young said.

The area where no fertilizer was applied yielded 26 bushels of oats per acre. The application of 100 pounds of 48 per cent superphosphate per acre increased the yield to 44 bushels. The area top-dressed with 100 pounds of ammonium nitrate per acre yielded 87 bushels per acre. Mr. Young's fertilizer, which cost $5.57 per acre, increased the yield of oats 61 bushels.

Another Arkansas farmer, Howard White of Maysville, told County Agent P. R. Corley that an application of 200 pounds of 20 per cent superphosphate and 100 pounds of ammonium nitrate increased his yield to 80 bushels an acre, compared with an average yielded of 30 to 40 bushels in that vicinity.

PULVERIZED
MASCOT
LIMESTONE
Trade Mark Registered

MAGNESIUM LIMESTONE
"It's a Dolomite"
American Limestone Company
Knoxville, Tenn.

VC
PRODUCTS

MIXED FERTILIZERS
SUPERPHOSPHATES
TRIPLE SUPERPHOSPHATE
PHOSPHATE ROCK
SULPHURIC ACID
PHOSPHORIC ACID
CALCIUM PHOSPHATES
MONOCALCIUM PHOSPHATE
SODIUM PHOSPHATES
TRISODIUM PHOSPHATE
CLEANSERS AND DETERGENTS
BURLAP AND COTTON BAGS

VIRGINIA-CAROLINA
CHEMICAL CORPORATION
HOME OFFICE: RICHMOND, VA.

Keyed SERVICE!

Fertilizer plants all over the country—large and small—state their needs and we meet them. Large stocks of seasoned materials and ample modern production facilities enable us to make prompt shipments.

TRIPLE SUPERPHOSPHATE

46 to 48% Available Phosphoric Acid

•

We also manufacture
HIGH-GRADE SUPERPHOSPHATE

•

U. S. Phosphoric Products
Division
TENNESSEE CORPORATION
Tampa, Florida

New York Office:
61 Broadway
Washington, D. C.
440 The Woodward Bldg.

Sales Agents:
Bradley & Baker
155 East 44th St.
New York, N. Y.

A Mark of FLORIDA TRIPLE PHOSPHATE *Reliability*

ALEX. M. McIVER
& SON

Specializing
SULPHURIC ACID
Nitrogenous Materials
Blood and Fertilizer Tankage
Phosphate Rock
Bone Meals
Dolomitic Lime
(42—44% Magnesium Carbonate)
Bags
SOUTH AMERICAN DRY
RENDERED TANKAGE

PEOPLES OFFICE BUILDING
Charleston, S. C.

Plant Food for Mississippi Pastures

Efficient and economical production of livestock and livestock products are directly related to the production of pastures, and fertilization is the most needed improvement practices on the majority of existing Mississippi pastures.

Pasture plants, like corn and cotton, require plenty of plant food for best growth. Even when started on good land, pastures grazed over a long period of years yield less and less unless the nutrients removed are returned. But pastures are often handicapped at the beginning by being placed on land too low in fertility for economical production, or on land that has been cropped or eroded until it has become unproductive. In either case, fertilization is a must if high production is to be maintained.

Phosphate has proven to be the most efficient and profitable mineral fertilizer that can be applied to the majority of pastures. For existing pastures the top-dressing of 300 pounds of 20 per cent superphosphate, or equivalent, every year, is recommended. Soils that test low in potash, or that have been grazed over a long period of time should be top-dressed with 100 pounds of muriate of potash every other year.

Used when it will least affect legume growth, nitrogen also proves profitable. An application of 100 to 200 pounds of nitrate of soda, or equivalent, in early July will greatly increase the production of pasture during summer months.

Liming existing pastures is somewhat different from liming new pastures, because the lime is not worked into the soil but remains on or near the surface, and overliming may result. For this reason, small applications of 500 to 1,000 pounds of liming material per acre are recommended.—From *Mississippi Farm Research.*

FERTILIZER RECOMMENDATIONS FOR SOUTHERN TOBACCO

(Continued from page 14)

materials of plant or animal origin; one-third from materials supplying nitrogen in the nitrate form; and one-third from standard inorganic sources of nitrogen. (Fertilizers that are claimed to be made according to the recommended formulas should contain not less than one-third of the total nitrogen in organic form and not less than one-fourth of the nitrogen should be water-insoluble). For the purpose of these recommendations, urea is considered the equivalent of an inorganic source of nitrogen.

2. *Phosphoric Acid.* To be derived from any source of available phosphoric acid, provided that the available calcium in the mixture shall conform to the requirements of Subsection (7) below.

3. *Potash.* To be derived from any source of available potash, provided the chlorine content of the mixed fertilizers so compounded does not exceed 2 per cent, except that in case of soils where the pH is above 5.6. the maximum may be 3 per cent. Where it is desired to apply additional side-dressings of potash, the sulphate is the most suitable form available for the purpose. If tobacco by-products are used as a source of potash, these must be sterilized to kill such disease organisms as might be present.

4. *Magnesia.* It is recommended that fertilizers carry 2 per cent magnesia (MgO), at least one-half of which shall be derived from water-soluble materials, or shall be water-soluble in the mixed fertilizer.

5. *Chlorine.* Available experimental data from bright tobacco sections of Virginia, North Carolina, South Carolina, Georgia and Florida show that a small quantity of chlorine in the tobacco fertilizer increases the acre value of the crop. Experiments have shown however, that an excessive amount of chlorine

Manganese Sulphate Available Now!
Fertilizer grade 65%
Hi-Grade 75%-80%
Write us today!
Tennessee Corporation - Dept. B - Atlanta, Ga.

Ashcraft-Wilkinson Co.

Fertilizer Materials — *Feeding Materials*

ALL FERTILIZER MATERIALS

FOREIGN AND DOMESTIC

Ammonium Nitrate **Sulphate of Ammonia**
Organic Ammoniates **Sulphur**

Exclusive Distributors: **DUVAL TEXAS SULPHUR**

Vegetable Oil Meals and Feedstuffs

HOME OFFICE: ATLANTA, GA.

BRANCHES:
NORFOLK, VA.
CHARLESTON, S. C.
JACKSON, MISS.
TAMPA, FLA.

CABLE ADDRESS:
ASHCRAFT

SUBSIDIARIES:
INTERSTATE MILLS, INC.
CAIRO, ILL.
INTERSTATE WAREHOUSE
MOUNDS, ILL.

SPECIFY

THREE ELEPHANT

BORAX

REG. U.S. PAT. OFF. REG. U.S. PAT. OFF.

. . . . WHEN BORON IS NEEDED TO CORRECT A DEFICIENCY OF THIS IMPORTANT SECONDARY ELEMENT

Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

AMERICAN POTASH & CHEMICAL CORPORATION
122 East 42nd ST., NEW YORK CITY
Pioneer Producers of Muriate of Potash in America

See Page 20

in fertilizers used for tobacco injures its growth and reduces quality, producing a thick, brittle leaf, which when cured becomes thin, soggy and dull in color. It also has an unfavorable effect upon the burning quality of the cured leaf. It is recommended, therefore, that fertilizers should be compounded in such proportions that the fertilizer mixtures shall contain 2 per cent chlorine. Where the pH of the soil is above 5.6, the maximum may be 3 per cent.

6. *Sulphur.* Sulphur is essential in bright tobacco fertilizers, but is usually contained in sufficient quantities in the materials recommended for compounding the fertilizers suggested by this conference. Materials containing excessive amounts of soluble SO_3 should be avoided in compounding bright tobacco fertilizers.

7. *Calcium.* Calcium is an essential element in tobacco production; and since fertilizers compounded with high analysis materials are sometimes low in calcium, it is recommended that tobacco fertilizers carry in an available form a minimum of 6 per cent of calcium oxide (CaO) equivalent.

8. *Boron.* Boron deficiency on tobacco has been observed in a very few instances. The application of not more than one-fourth pound of boron per acre (approximately 2.5 pounds borax) is suggested in such conditions, to be applied in the fertilizer at the time of planting or in the side-dresser.

Neutral Fertilizers

If neutral fertilizers are to be produced, it is suggested that the neutralizing agent be dolomitic limestone, as this material not only neutralizes but carries magnesia (MgO) and calcium (CaO), which are important plant nutrients. Basic fertilizers for bright tobacco are not recommended for general use.

Fertilizers for Plant Beds

Injury due to excess of chlorine has been widely observed in tobacco plant beds. Since fertilizers are applied to plant beds in relatively large quantities, even a small per cent of chlorine in the fertilizers may cause plant bed injury. It is, therefore, recommended that only such materials as are practically free of chlorides be used for making plant bed fertilizers, and that the fertilizer contain 6 per cent nitrogen, 9 per cent phosphoric acid, and 3 per cent potash applied at the rate of 1 pound to the square yard. The addition of 1 per cent available magnesia (NgO) will be beneficial in certain cases and its inclusion is generally to be recommended. In compounding this fertilizer, it is recommended that ¼ of the nitrogen be derived from nitrates, ¼ from natural organics, and ½ from any other standard inorganic sources.

Tung Meal as a Fertilizer Organic

With the increase in production of tung oil in the southern states, the fertilizer industry is being given a new source of much needed organic plant food and conditioning material, according to Dr. Robert S. McKinney, chemist at the Federal tung oil laboratory at Gainesville, Ga. Tung press cake is one of the few vegetable meals that cannot be used for feed purposes, due to its strong purgative and toxic properties.

The cake contains about 4.3 per cent nitrogen, 1.3 per cent phosphoric acid, and 1.4 per cent potash. In addition to its plant food, a small amount of this material acts as an excellent conditioner in fertilizer mixtures toprevent caking. Tung hulls may be used for the same purpose, and they also contain small amounts of nitrogen and potash.

CLASSIFIED ADVERTISEMENTS

WANTED to purchase—outright or controlling interest in going fertilizer business. Address "205" care THE AMERICAN FERTILIZER, Philadelphia 3, Pa.

WANTED—Two used Jeffrey, type G fertilizer diggers and loaders complete with motors. Address Johnson Cotton Company, Box 680, Dunn, N. C.

WANTED TO BUY—Complete acidulating unit. Rock mill, separator and mixing pan, etc. Write Johnson Cotton Company, Box 1259, Wilmington, N. C.

Cable Address: CABESCAR

SCAR-LIPMAN & CO., Inc.

Domestic—Foreign

FERTILIZER MATERIALS—CHEMICALS

GRAYBAR BUILDING, 420 LEXINGTON AVE., NEW YORK 17, N. Y.

THE BRADLEY HERCULES MILLS

AND GRIFFIN MILLS

For Fine or Semi-Fine Grinding of

PHOSPHATE ROCKS and LIMESTONE

Capacities 1 to 50 Tons Per Hour

Catalogs Mailed on Request

BRADLEY PULVERIZER COMPANY

Allentown, Penna.

76 YEARS MAKING GOOD BAGS

FULTON QUALITY

TEXTILE BAGS • WATERPROOF PAPER LINED BAGS

Fulton Bag & Cotton Mills

Manufacturers Since 1870

ATLANTA ST. LOUIS DALLAS MINNEAPOLIS

NEW YORK NEW ORLEANS DENVER KANSAS CITY, KAN.

"JAY BEE"

FERTILIZER GRINDER

"Jay Bee" grinds every grindable fertilizer ingredient, coarse or fine, cool and uniform.

All steel construction—heavy cast iron base. Practically indestructible. Biggest capacity for H.P. used. Handles products with up to 14% grease—30% moisture. Delivers finished products to storage bins without screens or elevators. Sizes and styles from 20 H.P. to 200 H.P. to meet every grinding requirement.

Write for complete details. Please state your grinding requirements.

J. B. SEDBERRY, INC.

Franklin, Tenn. Utica, N. Y.

★

Armour's

FERTILIZER MATERIALS

SUPERPHOSPHATE

PHOSPHATE ROCK

DOUBLE SUPERPHOSPHATE

SULPHURIC ACID

BONE MEALS

DRIED BLOOD

TANKAGES

BONE BLACK

PULVERIZED SHEEP MANURE

SHREDDED CATTLE MANURE

PIGMENT BLACK

SODIUM FLUOSILICATE

ARMOUR

FERTILIZER WORKS

GENERAL OFFICES: HURT BUILDING

ATLANTA, GA.

MAILING ADDRESS: P. O. BOX 1685

ATLANTA 1, GA.

★

THE AMERICAN CHEMICAL SOCIETY

(Continued from page 11)

pH, and amount of the element absorbed.

Most crops respond to Cu on acid organic soils, especially with soil pH of 6.0 or less. Most responsive crops may be benefited even when the soil is alkaline. In general, the lower the pH, the greater will be the percentage increase in yield.

Most crops show Mn deficiency and several B deficiency on alkaline or near-alkaline (pH 6.8 or above) soil, which deficiencies, if satisfied one year, may reoccur in succeeding years on alkaline soil. Permanent correction generally can be secured by application of S or by combined application of S and available salts of the deficient elements. B deficiency often is evident on newly reclaimed acid organic soil when such responsive crops as celery or spinach is grown, but the deficiency disappears after a year or two of heavy fertilization.

Zn deficiency thus far has been recognized only in onions on newly reclaimed soil and disappears after a few years of heavy fertilization. Increased growth does not result from the Zn application if the soil is deficient in Cu.

Na deficiency is not readily recognized by abnormal vegetative growth. Several crops show a growth response to NaCl, the amount of increase correlating fairly well with the increase in absorbed Na.

The Mineralogical Approach to some Soil Problems

C. D. Jeffries, Department of Agronomy, Pennsylvania State College, State College, Pa.

This paper consists of a discussion of the origin, distribution, and characteristics of the principal groups of minerals encountered in the mineralogical study of soils. These mineral groups consist of oxides, ferromagnesium minerals, feldspars, and clays. Methods for the isolation of minerals from soils has been an important part in the development of the subject. Consequently, the removal of organic matter and free iron oxides in soils previous to the separation and identification of the various mineral groups by their petrographic, chemical, and physical characteristics is described. Typical results of the mineral analysis of soils of different localities are presented to illustrate the use of such information as related to problems of soil genesis, formation, and agricultural operations.

FERTILIZERS IN WARTIME GERMANY

(Continued from page 10)

Leuna, estimated equivalent to about 385,000 tons of nitrogen annually, which had been converted to production of oil and alcohols. The pre-war capacity of the Oppau plant was about 180,000 tons of nitrogen per year. It is indicated that even under optimum conditions of plant repair, raw material supplies, transportation, etc., the total capacity for synthetic ammonia would not exceed 410,000 tons of nitrogen for the year ended June 30, 1946.

Table IV shows the export, import, and consumption of chemical nitrogen as fertilizer in the years 1936–37 to 1943–44. Consumption in the Old Reich gradually decreased from a peak of 718,200 metric tons in 1938–39 to only 366,700 tons in 1943–44—a reduction of 47.5 per cent and the lowest consumption

TABLE IV

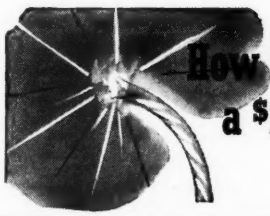
EXPORT, IMPORT, AND CONSUMPTION OF CHEMICAL NITROGEN FOR FERTILIZER, 1936–37 TO 1944–45

(Metric tons of N)

Year[1]	Export[2]	Import[3]	Consumption A[4]	Consumption B[3]
1936–37.....	132,653	20,100	571,700	571,700
1937–38.....	152,834	22,800	634,400	634,400
1938–39.....	111,986	30,447	718,200	745,000
1939–40.....	80,184	7,678	704,500	790,400
1940–41.....	34,446	4,926	674,700	789,200
1941–42.....	38,312	2,477	620,600	739,300
1942–43.....	35,768	15,390	506,100	632,300
1943–44.....	36,071	9,451	366,700	478,100
1944–45.....	(5)	(5)	120,000[6]	(5)

[1]June 1st to May 31st.
[2]Excluding deliveries to territories annexed by Germany after January 1, 1938, but including deliveries to the "Protectorate" and "General Government."
[3]Within the German "frontiers" of each year.
[4]In the Old Reich (boundaries of 1937).
[5]Data not available.
[6]Estimated.

STEDMAN
FERTILIZER PLANT EQUIPMENT
Dependable for more than 50 Years
All-Steel Self-Contained Fertilizer Mixin Units
Batch Mixers—Dry Batching
Pan Mixers—Wet Mixing
Swing Hammer and Cage Type Tailings Pulverizers
Vibrating Screens
Dust Weigh Hoppers
Acid Weigh Scales
STEDMAN'S FOUNDRY & MACHINE WORKS
AURORA INDIANA, U.S.A.



How to Pull the Fuse from a $20,000,000,000 Bomb

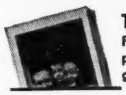
Imagine a super bomb whose explosion could rock the entire nation. Such a bomb EXISTS—*but you can help render it harmless.*

This bomb is surplus national income, which authorities estimate will total $20,000,000,000 this year.

Surplus income can be used to bid up prices. But widespread buying of U. S. Savings Bonds, by temporarily absorbing much of this money, will help check inflationary tendencies.

You're doing everybody a favor by continuing your payroll deduction plan for the regular purchase of U. S. Savings Bonds. At maturity, they pay $4 for every $3 invested!

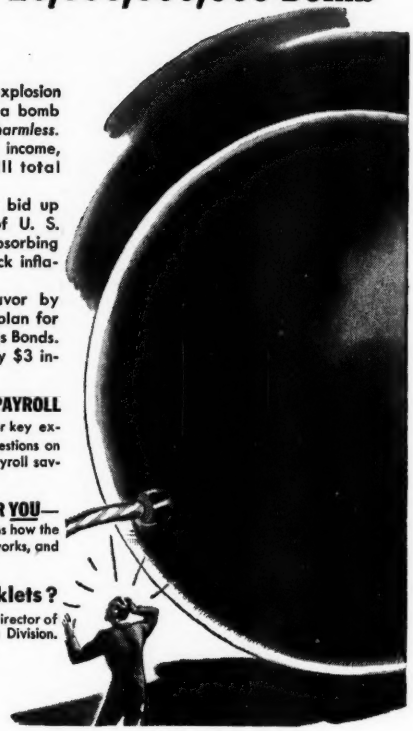
THE PEACETIME PAYROLL SAVINGS PLAN—For key executives. Contains suggestions on the conduct of your payroll savings plan.



THIS TIME IT'S FOR YOU—For employees. Explains how the payroll savings plan works, and goals to save for.

Are you using these booklets?

Quantities are available from your State Director of the Treasury Department Savings Bonds Division.



This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and Advertising Council

since 1932–33. The estimated consumption of 120,000 tons in 1944–45 was only 16.7 per cent of that in 1938–39. For the period 1939–40 to 1943–44 the consumption of nitrogen in the territories annexed by Germany averaged 111,300 tons annually. Imports of fertilizer nitrogen were mostly in the forms of ammonium sulphate and sodium nitrate, while the exports consisted chiefly of ammonium sulphate and calcium nitrate.

During the years 1936–37 to 1943–44 more than 15 different chemical nitrogen products were used as fertilizer in Germany. However, straight ammonium sulphate, Kalkammonsalpeter (Cal-Nitro or Nitro-Chalk), and calcium cyanamide together accounted for some 60 to 85 per cent of the total consumption (Table V). Consumption of straight ammonium sulphate, in particular, remained at a high level throughout the period and this compound was the leading source of nitrogen in most of the years. Also, very substantial quantities of nitrogen were used in the forms of ammonium sulphate-nitrate (Ammonsulfatsalpeter or Leunasalpeter) and calcium nitrate and, in some years, Nitrophoska and sodium nitrate. Although straight ammonium nitrate has not been used as fertilizer in Germany, this salt in the forms of Kalkammonsalpeter and ammonium sulphate-nitrate has been for a good many years one of the most important sources of nitrogen for German agriculture.

The average consumption of chemical fertilizer nitrogen in Germany increased steadily from 11.3 kilograms per hectare of arable land in 1931–32 to a maximum of 24.9 kilograms in 1938–39. It then decreased to 13.3 kilograms in 1943–44 and to approximately one-third this quantity in 1944–45. The pre-depression maximum was 15.1 kilograms in 1928–29. Among the various provinces the average consumption in 1938–39 ranged from about 13 kilograms in Bavaria and Württemberg to 41 kilograms in Anhalt and the Rhineland.

Of the chemical fertilizer nitrogen sold in Germany in 1938–39, 39.2 per cent was distributed to agricultural associations, 54.3 per cent directly to dealers and consumers, and 6.5 per cent to fertilizer factories for use in the preparation of mixtures. Similarly, the distribution of sales in 1942–43 was 42.9, 56.4, and 0.7 per cent, respectively. The very small sale of nitrogen to manufacturers of mixed fertilizers is in sharp contrast to the practice in the United States where approximately 50 per cent of the consumption of chemical nitrogen as fertilizer is in the form of commercial mixtures.

(To be continued in the next issue)

TABLE V

CONSUMPTION OF DIFFERENT CHEMICAL NITROGEN PRODUCTS AS FERTILIZER IN CERTAIN YEARS OF THE PERIOD 1936–37 TO 1943–44[1]

(Metric tons of N)

Product	Year[2] 1936–37	1938–39	1940–41	1942–43	1943–44
Ammonium sulphate	134,100	180,950	186,000	170,850	182,200
Ammonium sulphate-nitrate[3]	58,500	88,100	110,300	70,950	6,300
Calcium cyanamide	130,000	132,700	151,750	98,400	74,900
Calcium nitrate	44,700	54,000	69,900	61,800	38,800
Kalkammonsalpeter[4]	111,700	164,100	213,400	188,800	157,600
Nitrophoska[5]	36,800	53,800	16,000	11,800	....
Sodium nitrate	30,700	41,650	13,200	16,800	11,000
All other	25,200	29,700	28,650	12,900	7,300
Total	571,700	745,000	789,200	632,300	478,100

[1]Within the German "frontiers" of each year.

[2]June 1st to May 31st.

[3]$(NH_4)_2SO_4.NH_4NO_3$; known in Germany as Ammonsulfatsalpeter and formerly imported into the United States under the name of Leunasalpeter.

[4]A mixture of ammonium nitrate and calcium carbonate, containing 20.5 per cent N; known in the United States as Cal-Nitro and in Great Britain as Nitro-Chalk.

[5]Mixture containing N, P_2O_5, and K_2O.

SACKETT EQUIPMENT
for the Fertilizer Plant
BATCH MIXERS • PULVERIZERS
SCREENS • BUCKET ELEVATORS
CONTINUOUS AMMONIATING EQUIPMENT
BASING, MIXING & BAGGING UNITS
COMPLETE FERTILIZER PLANTS
THE A.J. SACKETT & SONS CO.
1701 S. HIGHLAND AVE., BALTIMORE, MD

BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

AMMONIA—Anhydrous and Liquor
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE
Spencer Chemical Co., Kansas City, Mo.

BAG MANUFACTURERS—Burlap
Bemis Bro. Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va

BAG MANUFACTURERS—Paper
Bemis Bro. Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago, Ill.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hammond Bag & Paper Co., Welisburg, W. Va.
Jaite Company, The, Jaite, Ohio
Raymond Bag Co., Middletown, Ohio.
St. Regis Paper Co., New York City.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Huber & Company, New York City.
McIver & Son. Alex. M., Charleston, S. C.

BAG CLOSING MACHINES
St. Regis Paper Co., New York City.
Union Special Machine Co., Chicago, Ill.

BAG PRINTING MACHINES
Schmutz Mfg. Co., Louisville, Ky.

BAGGING MACHINES—For Filling Sacks
Exact Weight Scale Co., Columbus, Ohio
St. Regis Paper Co., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md
Utility Works, The, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

BUCKETS—For Hoists, Cranes, etc.
Hayward Company, The, New York City.

BUCKETS—Elevator
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARS AND CARTS
Hough Co., The Frank G., Libertyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

CHEMICALS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Virginia-Carolina Chemical Corp., Richmond, Va

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CONDITIONERS
American Limestone Co., Knoxville, Tenn.
Keim, Samuel D., Philadelphia, Pa.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
McIver & Son, Alex. M., Charleston, S. C
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

CYANAMID
American Agricultural Chemical Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Scar-Lipman & Co., Inc., New York City.

DRYERS
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

FERTILIZER (Mixed) MANUFACTURERS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Minerals and Chemical Corporation, Chicago, Ill
Virginia-Carolina Chemical Corp., Richmond, Va.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.

FOUNDERS AND MACHINISTS
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

HOPPERS
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Scar-Lipman & Co., Inc., New York City.

INSECTICIDES
American Agricultural Chemical Co., New York City.
McLaughlin GormleyKing Co., Minneapolis, Minn.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.

LOADERS—Car and Wagon
Hough Co., The Frank G., Libertyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making and Handling
Chemical Construction Corp., New York City.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

MACHINERY—Ammoniating
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Hough Co., The Frank G., Libertyville, Ill.
Hayward Company, The, New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

MACHINERY—Grinding and Pulverizing
Bradley Pulverizer Co., Allentown, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Sedberry, Inc. J. B., Franklin, Tenn. and Utica, N. Y.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

MACHINERY—Material Handling
Hayward Company, The, New York City.
Hough Co., The Frank G., Libertyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

MACHINERY—Mixing, Screening and Bagging
Exact Weight Scale Co., Columbus, Ohio
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

MACHINERY—Power Transmission
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Superphosphate Manufacturing
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, New York City.

NITRATE OF SODA—Continued
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PHOSPHATE ROCK
American Agricultural Chemical Co. New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Davison Chemical Corporation, Baltimore, Md.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill
McIver & Son, Alex. M., Charleston, S. C.
Ruhm, H. D., Mount Pleasant, Tenn.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.
Virginia-Carolina Chemical Corp., Richmond, Vc.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.

REPAIR PARTS AND CASTINGS
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

ROUGH AMMONIATES
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

SCALES—Including Automatic Bagging
Exact Weight Scale Co., Columbus, Ohio
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

BUYERS' GUIDE

SCREENS
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
McIver & Son, Alex. M., Charleston, S. C
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City.
Virginia-Carolina Chemicrl Corp., Richmond, Va.

SULPHURIC ACID
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Davison Chemical Corporation, Baltimore, Md.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., Inc., New York City.
Schmaltz, Jos. H., Chicago, Ill.

UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

VALVES
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Utility Works, The, East Point, Ga.

Alphabetical List of Advertisers

American Agricultural Chemical Co., New York City....16
American Limestone Co., Knoxville, Tenn....22
American Potash and Chemical Corp.. New York City....20, 25
Armour Fertilizer Works, Atlanta, Ga....27
Ashcraft-Wilkinson Co., Atlanta, Ga....25
Baker & Bro., H. J., New York City....Front Cover
Bemis Bro. Bag Co., St. Louis, Mo. 21
Bradley Pulverizer Co., Allentown, Pa 27
Bradley & Baker, New York City....14
Chase Bag Co., Chicago, Ill....5
Chemical Construction Corp., New York City....—
Davison Chemical Corporation, Baltimore, Md. ....—
Du Pont de Nemours & Co., E. I., Wilmington,Del.. 3
Exact Weight Scale Co., Columbus, Ohio ....—
Fulton Bag & Cotton Mills, Atlanta, Ga....27
Gascoyne & Co., Inc., Baltimore, Md....34
Hammond Bag & Paper Co , Wellsburg, W. Va....—
Hayward Company, The, New York City....34
Hough Co., The Frank G.,Libertyville, Ill....4
Huber Co., L. W., New York City....—
Hydrocarbon Products Co., New York City....17
International Minerals & Chemical Corporation, Chicago, Ill....6
Jaite Company, The, Jaite, Ohio....—
Keim, Samuel D., Philadelphia, Pa....33
McIver & Son, Alex. M., Charleston, S. C....23
Mente & Co., Inc., New Orleans, La....—
Monarch Mfg. Works, Inc., Philadelphia, Pa....34
McLaughlin Gormley King Co., Minneapolis, Minn..—
Potash Co. of America, New York City....3rd Cover
Raymond Bag Co., Middletown, Ohio....—
Ruhm, H. D., Columbia, Tenn....34
Sackett & Sons Co., The A. J., Baltimore, Md....30
Scar-Lipman & Co., Inc., New York City....26
Schmaltz, Jos. H., Chicago, Ill....34
Schmutz Mfg. Co., Louisville, Ky....—
Sedberry, Inc., J. B., Franklin, Tenn. and Utica N. Y...27
Shuey & Company, Inc., Savannah, Ga....34
Spencer Chemical Co., Kansas City, Mo...Back Cover
Stedman's Foundry and Machine Works, Aurora, Ind....28
St. Regis Paper Co., New York City....18, 19
Tennessee Corporation, Atlanta Ga....24
Texas Gulf Sulphur Co., New York City....—
Union Special Machine Co., Chicago, Ill....—
U. S. Phosphoric Products Division, Tennessee Corp , Tampa, Fla....23
United States Potash Co., New York City .. 2nd Cover
Utility Works, The, East Point, Ga....34
Virginia-Carolina Chemical Corp., Richmond, Va....23
Wiley & Company, Inc., Baltimore, Md....34

FEEDING AND FERTILIZER MATERIALS

(SINCE 1898)

SAMUEL D. KEIM
1343 ARCH STREET
PHILADELPHIA 7, PA.

MONARCH SPRAYS

This is our Fig. 645 Nozzle. Used for Scrubbing Acid Phosphate Gases. Made for "full" or "hollow" cone in Brass and "Everdur." We also make "Non-Clog" Nozzles in Brass and Steel, and

Stoneware Chamber Sprays

now used by nearly all chamber spray sulphuric acid plants.

CATALOG 6-C

MONARCH MFG. WORKS, INC.
Westmoreland and Emery Sts., Philadelphia, Pa.

HAYWARD BUCKETS

Use this Hayward Class "K" Clam Shell for severe superphosphate digging and handling.

THE HAYWARD CO., 202 Fulton St., New York

GASCOYNE & CO., INC.

Established 1887

Chemists and Assayers

Public Weighers and Samplers

27 South Gay Street - BALTIMORE, MD.

SHUEY & COMPANY, Inc.

Specialty: Analysis of Fertilizer Materials and Phosphate Rock. Official Chemists for Florida Hard Rock Phosphate Export Association. Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemists for National Cottonseed Products Association

115 E. BAYSTREET, SAVANNAH, GA.

H. D. RUHM

Phosphate Consultant

305 W. 7th Street

COLUMBIA TENNESSEE

The Dictionary of Fertilizer Materials and Terms

A revised edition containing complete description and analyses of all plant foods and materials used in manufacturing chemical fertilizers. A handy reference book for fertilizer manufacture and salesmen, agricultural chemists, students, etc.

Price $1.00 Postpaid

Ware Bros. Company, 1900 Chestnut St., Philadelphia 3, Pa.

WILEY & COMPANY, Inc.

Analytical and Consulting Chemists

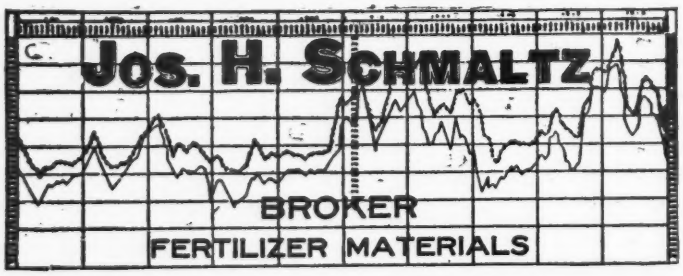
BALTIMORE 2, MD.

Fertilizer Machinery *AND* Acidulating Equipment

BATCH MIXERS — PULVERIZERS — CAGE MILLS — SCREENS — SCALES
ELEVATORS, AND ALL OTHER EQUIPMENT FOR COMPLETE PLANTS

THE UTILITY WORKS - - EAST POINT, GA.

Tankage
Blood
Bone
All
Ammoniates



327
South
La Salle
Street
CHICAGO

PCA'S RED INDIAN LOOKS AHEAD...

Soil scientists and practical farmers agree that the wisdom of high potash application is unquestioned. It is a thoroughly established fact that *Potash Pays.*

Potash is one of the large lacks in American soil. PCA, now in its second decade of service, faces the coming era of heavy fertilization, determined to make utmost effort to produce and supply high grade Red Muriate of Potash to meet the needs of the fertilizer industry . . . to continue to merit the confidence and reliance which the industry has displayed toward this company and its products.

P.C.A.
The SALT of the EARTH
RED MURIATE

POTASH COMPANY of AMERICA

ARMY E NAVY

CARLSBAD, NEW MEXICO

GENERAL SALES OFFICE...50 Broadway, New York, N. Y. • MIDWESTERN SALES OFFICE...612 Lehmann Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE... . . . . The Candler Building, Atlanta, Ga.

Another Vital NEW SPENCER PRODUCT

SPENSOL

SPENCER NITROGEN SOLUTIONS

for

FERTILIZER MIXING NEEDS

Ready in October! This newest HI-NITROGEN fertilizer product will be available from Spencer Chemical Company's Jayhawk works...to serve the expanding needs of agriculture. A network of direct-line railroads brings this new mid-continent source of vital fertilizer chemicals conveniently available to any part of the United States.

TECHNICAL ADVISORY STAFF

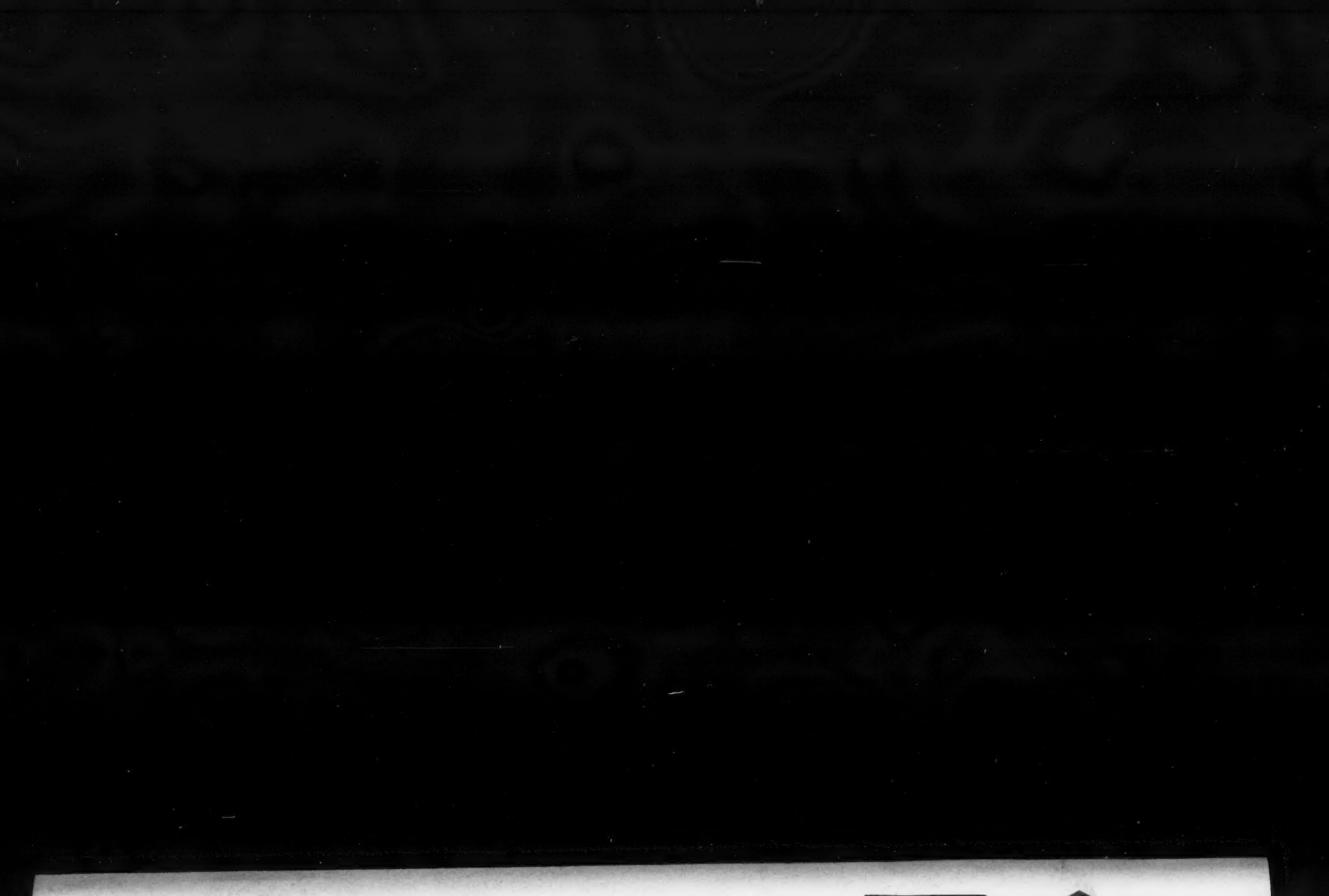
Spencer maintains an experienced staff of chemists and engineers whose technical advice is available to all fertilizer users without charge. Make sure of your SPENSOL supply by phoning your orders now.

COMPOSITION OF SPENSOL (SPENCER NITROGEN SOLUTIONS)

	Ammonium Nitrate %	Anhydrous Ammonia %	Water %	Total Nitrogen %	Nitrate Nitrogen %	Ammonia Nitrogen %
SPENSOL A	65.0	21.7	13.3	40.6	11.36	29.24
SPENSOL B	55.5	26.0	18.5	40.8	9.62	31.18
SPENSOL C	66.8	16.6	16.6	37.0	11.65	25.35

Spencer Chemical COMPANY

FERTILIZER

General and Sales Offices: Dwight Building, Kansas City 6, Missouri
Works: Pittsburg, Kansas

• **Manufacturers of HI-NITROGEN Fertilizer Products.**